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PROCEEDINGS

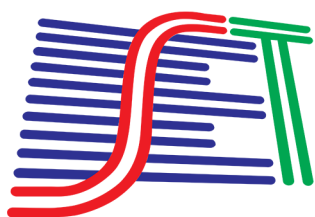
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PROCEEDINGS

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Presentation

The **SET EXPO Technology Conference**, as well as the related concurrent events, seek to discuss the future of the Broadcast, Telecommunications, Audiovisual and New Media industry, as well as their inherent relationships with a range of issues: computing, infrastructure, communication, production and regulatory affairs. This magazine, called **SET EXPO PROCEEDINGS**, also known by its acronym SETEP, is a compilation of the entire conference agenda, that is, a description of the entire contents of all sessions at what is largest encounter of its kind in this region of the globe. Thus, as the entity staging this event, SET (the Brazilian Society of Television Engineering) believes that information sharing can but work to the benefit of rich and innovative discussions so that we can continue to build an active community and a strong sector, in addition to achieving the desire, with which we have always been imbued, to push the envelope. The board, president, members, associates, staff, directors, partners, organizations and supporters, whether from the public or private sector and/or government, Brazilian and/or international, wish to thank all those who have always been instrumental in helping us to fulfill our passion for the development of this area.

We would also like to reiterate the information that this publication has been properly registered with the ISSN in printed and electronic formats, and that each session was recorded and allocated a persistent link. It is worth pointing out that this magazine is available in three languages: Portuguese and English.

ORCHESTRATION FOR CONTENT PRODUCTION

Our panel will demonstrate how orchestration, collection, and analysis solutions of workflow metadata enable companies to gain efficiency, improving the management of all available resources in the production chain (Supply Chain Management).

Chair: Carlos Cauvilla, Operations Technology Director, SBT | SET Advisor

- **WHEN WILL AV1 BE READY FOR ADOPTION IN LATIN AMERICA? ALREADY?!**

Speaker: Simon Eldridge, Chief Product Officer at SDVI

- **SOLVING THE PROBLEM OF PRODUCTION PLANNING AND EFFICIENT METADATA EXCHANGE**

Speaker: Gabriel Ricardo Hahmann, Senior Business Development Director LATAM at MEDIAGENIX

From production planning to the accurate exchange of content metadata, broadcasters and producers struggle to ensure that metadata is properly collected throughout the production lifecycle and delivered efficiently to viewers. We will demonstrate how this workflow can be simplified and collaborative among entities and production teams, maximizing resources and bringing significant efficiencies to the content supply chain.

- **AI AND CONTENT PRODUCTION**

Speaker: David Kaszycki, Co-Founder and CEO of Beam Dynamics
Data and AI is changing the way that content is produced across the globe, yet most organizations are not prepared to properly capture, standardize and link their data to realize the benefits. This talk will show how major production companies are leveraging their existing data to gain increases in performance and a significant reduction of production expenses.



Carlos Cauvilla, Operations Technology Director, SBT | SET Advisor

Director of Technology and Operations at SBT, Engineer with an MBA in Business and Information Technology. Cycling close to the mountains is my way of freeing up space to absorb new ..



Simon Eldridge, Chief Product Officer at SDVI

For 20 years in both Europe and North America, Simon has built an extensive track record of creating and managing successful product lines in management roles at leading providers in the media and entertainment space, most recently as director of product management. products, workflow and manageability at Harmonic. In this role, Simon oversaw Harmonic's broad portfolio of software applications for media and workflow management for production, broadcast and distribution. Previously, Eldridge worked at Omneon, where he managed the software portfolio and relationships with third-party OEM partners. Prior to joining Omneon in 2006, Eldridge managed the digital asset management product line of Harris Broadcast and Encoda Systems, both through their acquisition of Arkemedia Technologies, which he co-founded in the UK in 1999. His extensive experience and Eldridge's skills in technology and marketing provide him with a unique industry awareness. Eldridge obtained a bachelor's degree with honors in marketing design from Southampton Solent University in the United Kingdom.



Gabriel Ricardo Hahmann, Senior Business Development Director LATAM at MEDIAGENIX

With experience in the technology, media and entertainment market, Gabriel was responsible for pre-sales and business development for Latin America over the last 20 years, supporting strategy and growth of telecommunications and digital security companies. Since 2021 Gabriel has been responsible for Business Development for MEDIAGENIX in Latin America.



David Kaszycki, Co-Founder and CEO of Beam Dynamics

Founded Beam Dynamics in 2020. · Received Pilot Innovation Award by NAB in 2021. · Previously founded two digital media companies. · Was Strategic Account Manager at Videndum and Global Account Manager at LG Electronics.

SOMETHING HAS CHANGED IN THE DISTRIBUTION OF SIGNALS FOR LINEAR TV IN RECENT YEARS? THE ANSWER IS YES!

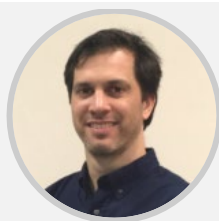
We are in a complex environment for signal distribution, with increasingly more transport model options. Given everything from satellite and 5G, SRT in the cloud and orchestration with SDWAN, what is the best method for each scenario? In this panel we will have in-depth knowledge of the industry who will bring their visions and answers to the impasses of linear distribution.

Moderator: Roberto Hoffmann Technology and regulatory project manager at RBS TV Porto Alegre

Speakers:

- **Daniel Diniz**, LATAM Sales Director, Net Insight
- **Guilherme Saraiva**, Commercial Director, Embratel
- **Camilla Cintra**, Telecom Project Manager, Globo
- **INTELSAT MEDIA SERVICES: INNOVATION IN CONTENT DISTRIBUTION**

Marcelo Amoedo, Senior Sales Director - Intelsat Broadcast Services, Brazil
Intelsat is exploring the transformation of the global media landscape, including specifically Brazil, and how it is adapting to meet the ever-evolving needs of modern broadcasters. The company is innovating in hybrid distribution models and increasing investments in Brazil, including a new Media PoP in Rio de Janeiro.



Roberto Hoffmann Netto, Technology and regulatory project manager at RBS TV Porto Alegre

Electrical engineer, with emphasis on automation, graduated from Unisinos. He has worked for over 15 years in broadcast and telecommunications companies, with extensive experience in management system projects, multiservice networks and IT and Broadcast platforms. He worked on implementations in Brazil and Latin America, having worked at Claro, Deutsche Telekom and Smartcom PCS. He is currently manager of technology and regulatory projects at RBS TV Porto Alegre.



Daniel Diniz, LATAM Sales Director, Net Insight

Electronic Engineer graduated from the Mackenzie School of Engineering and Master in Telecommunications also from the same Mackenzie School of Engineering, working on Digital TV tests during his undergraduate and master's degrees. Since then, he has been working in the Broadcast area, developing projects and businesses throughout Latin America. He is currently Sales Director for Latin America for Net Insight.



Guilherme Saraiva, Commercial Director, Embratel

Guilherme is Commercial Director for the Media and Satellite Segments at Embratel, where he supports clients in developing their businesses in the physical and digital worlds. Telecommunications engineer from IME, with an MBA in marketing from FGV, Master in Finance from FGV and MBA in Data Science from PUC-RJ.



Camilla Cintra, Telecom Project Manager, Globo

Camilla Cintra is a Telecommunications Engineer with an MBA in Project Management. He has more than 20 years of professional experience in national companies in the Telecom and Broadcasting segments such as Globo, Embratel and Oi, working in the management of multidisciplinary teams and strategic projects. He currently leads teams responsible for the development and implementation of TV distribution solutions, connectivity, network platforms and the development of new Telecommunications products.



Marcelo Amoedo, Senior Sales Director - Intelsat Broadcast Services, Brazil

Business professional with more than 20 years of experience in the Broadcast market and knowledge in video transmission and compression systems, Digital TV and satellite communication services. At Intelsat he works as responsible for commercializing space segments for use in permanent broadcast services and occasional use, as well as managed media services. Computer Network Technologist, Bachelor of Business Administration and Postgraduate in MBA in Digital TV, Broadcasting and New Media.

RANSOMWARE, A REAL THREAT – PREVENTION AND LESSONS LEARNED

In this panel we will discuss ransomware cases that have occurred in the media and entertainment industry, the recovery process for attacked companies and how we can prepare to prevent new incidents from happening.

Moderator: Eduardo Fedorowicz, Cyber Security Manager, Globo

Speakers:

- **Guilherme Cosentino**, Strategic Cyber Security Services Manager, Mandiant
- **Alex Viana**, INFRASTRUCTURE AND INFORMATION SECURITY MANAGER, RECORD TV
- **Michel Pereira e Silva**, Infrastructure and Information Security Manager, TV Anhanguera



Eduardo Fedorowicz, Cyber Security Manager, Globo

Information Technology and Security Executive, graduated in Computer Science (UGF) and postgraduate in Project Management (FGV). He has extension and specialization courses in Business Process Management (PUC-RJ), Exponential Management (Nova SBE), Executive Strategy and Cyber Security (Stanford University) and more than 20 years of experience in the area of information security. At Globo, he works as Cyber Security manager, being responsible for the Blue Team (Cyber Intelligence, Proactive Defense and Incident Response) and Red Team (Offensive Security) teams.



Guilherme Cosentino, Strategic Cyber Security Services Manager, Mandiant

Graduated in Engineering from Instituto Mauá de Tecnologia, with an MBA from FGV and with recognized certifications in the area of cybersecurity, Guilherme has worked in information security for over 20 years. He was an information security manager in multinational companies and works as a security consultant, having helped hundreds of companies to define and successfully implement their security strategies and projects. He is an information security enthusiast as a means of enhancing the use of technologies that simplify the day-to-day lives of people and companies. He is passionate about survival games, music and finds it fun to memorize complex passwords.



Alex Viana, INFRASTRUCTURE AND INFORMATION SECURITY MANAGER, RECORD TV

With a Master's degree in Management and Technology from Centro Paula Souza, with an MBA in Information Security and a Degree in Network Infrastructure, Alex has worked in the area for 19 years in the services, retail and television segments. In addition to being a Cisco Certification Instructor and University Professor in his spare time, at Record TV, he has worked as Infrastructure and Cybersecurity Manager for 9 months (since the incident), leading the Support, Infrastructure, Datacenter and Information Security teams. Husband, Father of two and lover of the best sport: Basketball.



Michel Pereira e Silva, Infrastructure and Information Security Manager, TV Anhanguera

Graduated in Networks and Telecom from Uni-Anhanguera GO, Specialist in Cybersecurity, Data Protection and Data Center. He has been working in the Television segment for over 10 years.

VIRTUAL PRODUCTIONS – FROM TECHNOLOGICAL INNOVATIONS TO PRACTICAL IMPLEMENTATIONS IN TV, CINEMA, AND GAMES

In this panel, we will show technological advances in the composition of virtual scenarios (AR – augmented reality, VR – virtual reality and XR – extended reality), with details of the infrastructure involved, with low-cost solutions, up to large projects, also including gaming industry, the use of LED screens and the use of AI (artificial intelligence).

Moderator: Caio Klein, General Director of TVE RS

• AN OVERVIEW OF VIRTUAL PRODUCTION TODAY

Speaker: **Jorge Martinez, Director of Business Development for the Americas and Director of Sales for Latin America, Stype**

Types of virtual production: AR (Augmented Reality), VR (Virtual Reality) and XR (Extended Reality). Pros and cons of these technologies.

Aspects to consider: Cameras, lenses, render engine, Genlock, tracking systems, lighting, LED panels

Worldwide use cases (AR, VR and XR).

State of the art of the Brazilian market regarding these technologies.

• HIGH-PERFORMANCE, LOW-COST VIRTUAL PRODUCTION AND THE TECHNOLOGICAL DISRUPTION OF MOTION GRAPHICS

Speaker: **André Arnaut, Specialist in Virtual Production and Motion Graphics for Broadcast**

Today, the global virtual production market is experiencing a true revolution with the powerful Unreal, a game engine that is transforming the way content is created. Hollywood is already under its thumb, with epic productions like Disney's Mandalorian surrendering to this revolutionary technology. And here in Brazil, our broadcasters and producers are not left behind, building virtual scenarios with quality and results never seen before. The exponential rise of this technology in the world and in our country is indisputable.

Thanks to advanced tools such as Aximmetry, operating virtual productions in Chroma Key, Xr LedWall and Augmented Reality has become extremely accessible. Now,

deploying these innovative solutions is easier than ever, and best of all, at a very low cost. This is a crucial time for all video companies to completely rethink their production workflows.

- **VIRTUAL AND XR PRODUCTION: REINVENTING FILMMAKING AND AUDIOVISUAL WITH LED WALLS**

Speaker: **Nelson Maluf, Virtual Production Director, Disguise**
Dive into a new world of content creation. From movies to TV shows, advertising to entertainment, technologies like LED panels, high-performance servers, camera tracking and game engines are changing the way we produce and experience content. Come discover how these innovations are shaping the future of the professional production industry.

- **VIRTUAL PRODUCTION – FROM THE TRADITIONAL USE TO AI • RESUMO**
Speaker: **Paulo Rabello, Director of Hub Operations and Content Distribution, Globo**

The intensive use of virtual production technologies has allowed incredible opportunities in our industry since long time. This technology has been enabled solutions that would be impossible to produce or that would be very expensive if implemented through traditional processes. There is no doubt that virtual production technology will boost with the application of Artificial Intelligence. What positive and negative impacts can we expect on our content production processes?



Caio Klein, General Director of TVE RS

Electrical Engineer graduated from UFRGS, with a Postgraduate Degree in Strategic Leadership in Business and People from ESPM-RS. He began his career at RBS, holding various roles within the group. Then, for 10 years, he was Technical Director at TVE-RS. He returned to RBS to be the Technical Manager of the Group's Radios and later being the Executive Manager of TV Operations, where he participated in the coverage of the 2006, 2010, 2014 and 2018 World Cups, the 2008 and 2012 Olympics and the 2006 Interclub World Cup. , 2010 and 2017, coordinating the logistics of Grupo RBS in these events. He is currently the General Director of TVE RS.



Jorge Martinez, Americas Business Development Director and Latin America Sales Director, Stype

Jorge Martinez is stYpe's sales and operations leader for Latin America and some projects on the east coast of the USA and in Spain. His experience as an Electronics Engineer has led him to work in the broadcast and live events industry for the past 24 years. He worked from TV stations such as TV Azteca in Mexico to pay TV channels such as Grupo HBO Latin America, where he worked on the engineering and operations team. These experiences led him to join Vizrt where, for nine (9) years, he led the sales and operations team in Mexico, Central America and the Caribbean. Martinez joined stYpe in early 2021 to expand Virtual Production solutions with its camera and object

tracking systems as well as rendering solutions developed for Unreal Engine called StypeLand, Green Killer and Stype XR, boosting the Cinema industries , Ads and TV helping producers and content creators develop new narrative universes using tracking and rendering solutions.



André Arnaut, Specialist in Virtual Production and Motion Graphics for Broadcast

Specialist in virtual production in Unreal and motion graphics with 22 years of experience in large national and international projects from broadcasters to large virtual productions, XR LedWall and Augmented Reality, Partner at Begin Play official Epic Games Unreal authorized training center in Brazil, Authorized and certified Aximmetry agent, Educator and speaker in virtual production.



Nelson Maluf, Virtual Production Director, Disguise

Video Director with over 25 years of experience. Graduated from Full Sail University in Film and TV Production in the USA. His career stands out for his 12-year participation as Video Director on singer Julio Iglesias' world tour, covering 64 countries. Currently, Nelson is the first Brazilian certified by the Disguise Virtual Production Accelerator, and helps clients build studios for Virtual Production and xR with LED panels and high-performance servers.



Paulo Rabello, Director of Hub Operations and Content Distribution, Globo

Paulo Rabello is a computer engineer with 26 years of experience in the Broadcast and Media industry. He is a member of PMI (Project Management Institute) and has held the professional proficiency title in project management since 2003, as well as an MBA in project management. He began his career at Globo as an engineer in 1995. Over these years, he was director of the Projects and Maintenance area as well as director of technology for Entertainment, leading technology projects in 4K and 4k HDR productions in dramaturgy. Currently, he is the technology leader for all of Globo's content production and distribution processes, not only for Drama and Variety, but also for Sports and Journalism.

CHALLENGES FOR CLOUD PRODUCTION

- Live cloud content production is undoubtedly one of the greatest revolutions in the media industry. Agility, flexible processes, scalable environments, and reduced production costs are some of the main reasons that make this technology extremely attractive and necessary for organizations.
- However, currently, most solutions heavily rely on desktop applications and compressed media rather than native cloud methodologies. There is some pressure to migrate current on-premises systems to the cloud through a “lift-and-shift” process.
- When will we have fully native cloud systems to fully leverage the strengths of this technology? How can we improve the quality of video produced in the cloud compared to uncompressed formats used in on-premises systems? How can we address issues like delay, synchronization, and interoperability? These are some of the challenges that will be addressed in this panel.

Moderator: Wilson Oliveira de Almeida, Coordinator of the TV 3.0 GT, SET

• LEVERAGING MULTI VENDOR INFRASTRUCTURE FOR REMOTE LIVE PRODUCTION

This presentation discusses a case study, developed with Grass Valley, RTS and AWS solutions, of how multiple hybrid/cloud-native solutions from different vendors are managed together to make cloud-based productions as easy as they were in the past using on-premises infrastructure. The first part presents the underlying architecture, which is based on media services blueprints. Those include a set of virtual functions (a replay or multi-viewer function) and also describe how the functions get connected to each other. Profiles are defined to apply different configurations to a virtual function and a resource management layer maps resources that are available and have the capabilities and the required capacity to execute the live production. Mediation translates the profile parameters into the required API calls to ensure that solutions from different vendors can be used independently of the supported protocols. The 2nd part discusses the entire lifecycle management of a production and how we can automate things as much as possible: enter planning data, deploy/configure resources, present control surfaces, monitor the event and finally decommission resources again, as if we were turning on an OB van for that production and, at the end, turn it off, making resources available for next live event. In summary, it shows the ability to simplify cloud multi vendor live remote production.

Speaker: **Fabio Acquati**, Chief Technology Officer, NGN Telecom

• CHALLENGES AND STRATEGIES IN PRODUCING EVENTS IN THE CLOUD: CONNECTIVITY AND DISTRIBUTED OPERATION

Producing events in the cloud presents numerous benefits, such as scalability, flexibility, and cost reduction. However, this approach also brings significant challenges in terms of connectivity and distributed operation. We will explore these challenges and the strategies to overcome them.

Connectivity is a central concern in cloud-based event production. Real-time transmission of audio, video, and data requires a reliable and high-bandwidth connection between the event location and the cloud. Latency is a critical challenge, as any delay in transmission can compromise the operators' experience and the product's quality. The use of advanced technologies, such as fiber optic networks and 5G, is necessary to ensure a stable and low-latency connection.

Different parts of the production process may occur in geographically dispersed locations. Managing and synchronizing these distributed operations requires a robust infrastructure and efficient control systems.

The use of efficient video compression protocols and optimization techniques helps reduce the required bandwidth for transmission, minimizing connectivity challenges. New solutions and innovations are emerging to address the challenges of connectivity and distributed operation. The ongoing advancement of 5G networks, the expansion of fiber optic infrastructure, and MEO satellite constellations promise to further improve connectivity and real-time responsiveness.

Speaker: **Boris Kauffman**, Solutions Architect Broadcast Specialist at Amazon Web Services (AWS)

• HIGH QUALITY PRODUCTIONS IN THE CLOUD

In addition to showcasing the AMPP and AMPP Grid tools, Bill Rice will be providing a comprehensive insight into Infrastructure, Protocols, Codecs, use cases, connectivity, and latency related to high-quality content and experiences in the cloud.

Speaker: **Bill Rice**, Director of Pre-Sales - Americas, Grass Valley



Wilson Oliveira de Almeida, Coordinator of the TV GT 3.0, SET

Telecommunications Engineer with an MBA in Network Management and Internet Technology at the Electronic Computing Center at UFRJ. Since 1994 he has worked in the Television sector and currently holds the position of Media Solutions Manager at Globo, with active participation in technology transformation processes, now focusing on the challenges of infrastructure migrations to IP & Cloud and the development of new codecs & formats with AIMS. He also coordinates the GT for TV 3.0 at SET, in addition to dedicating himself to virtual productions in XR, LED panels and projections. Married with 2 teenage children, passionate about his family and traveling, he continues to pursue his dream of becoming a... Barbecue Chef.



Fabio Acquati, Technology Director, NGN Telecom

He began his career at Tektronix, working as a Video Systems Engineer for South America and, during this period, he followed the evolution and transition of video systems, participating in the first digital TV tests in Brazil. He is currently Director of Technology at NGN Telecom, a company he founded and which works with monitoring, quality assurance and process automation solutions, where he acquired knowledge in the world of IP networks. Participates in the GT IP/Cloud and GT OTT groups, from SET, is an instructor at Globo's technology academy, provides training in the area and studies technology with the manufacturers he represents, participating in implementations and proofs of concept, experiencing the challenges of the world Video, IP, Cloud, workflow orchestration and process automation.



Boris Kauffmann, Broadcast Specialist Solutions Architect at Amazon Web Services (AWS)

He has over 15 years in the media industry, working in technology positions in broadcast, post-production and digital media preservation. Prior to AWS, he was responsible for the design and architecture of several IP-based video routing systems (SMPTE 2110) as a Solutions Engineer at Imagine Communications. Implemented several playout, master-control and routing systems in broadcasters in Latin America. Previously, he served as a Laboratory Technician at Cinemateca Brasileira, supervising migration and restoration workflows for films and videotapes in legacy formats. He has a degree in Electrical Engineering with an emphasis on Telecommunications from Universidade Presbiteriana Mackenzie in Brazil and is currently a master's student in the Postgraduate Program in Electrical and Computer Engineering at Universidade Presbiteriana Mackenzie, researching the transport layer of the new Brazilian Digital Television System (SBTVD 3.0).



Bill Rice, Director of Pre-Sales - Americas, Grass Valley

Bachelor of Science, Computer Engineering Technology / 2003 - 2006, Middle Tennessee State University (MTSU). Sales and Technology Manager with experience in product development, cloud architecture, customer service, networks, RF, broadcast, quality assurance, Linux administration and digital TV. I have the ability to sell, plan, develop, test, implement and maintain video technology, as well as train staff on existing and new solutions. I always put the customer first and I know how to inspire the team. Companies need employees who are constantly learning as technology evolves. Technology has enabled new efficiencies and revenue streams that were previously unthinkable.

PIRACY IN CHECK. INDUSTRY AND PUBLIC POWER UNITED IN COMBAT

Piracy is a chronic and longstanding problem that has been transformed by technology. According to data from the National Front Against Piracy and Illegality (FNCP), in 2021, piracy of pay-TV and audiovisual content resulted in a loss of R\$ 19 billion to the industry. In this panel, we will discuss strategies and other forms of combating the reduction of pirated content availability on IPTV boxes, clandestine websites, and other platforms.

Moderator: Diogo Leuzinger, Information Security Coordinator, Globo

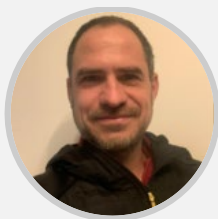
Speakers:

• CHALLENGES OF STATE ACTION IN THE CYBER ENVIRONMENT: THE CASE OF AUDIOVISUAL PIRACY BLOCKADES IN BRAZIL

Jonas Antunes, Legal Director, ABTA – Brazilian Pay TV Association

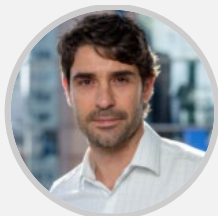
Access to the internet is already a reality for the majority of Brazilians. Unfortunately, the side effect of this growth is the increase in cybercrime. The anonymized environment of the internet makes it easier to commit illegal acts. Audiovisual piracy is one of these illegal practices. Criminals provide unauthorized access to audiovisual content via TV boxes, applications, websites and illegal IPTV lists. Around the world, dynamic blocks by telecommunications operators have attempted to interfere in these illegal operations and encourage the consumption of legal offers. But the challenges in implementing these lockdowns are not small. The Brazilian case is an example of this.

- **Moisés Queiroz Moreira, Advisor to Anatel - Anatel - National Telecommunications Agency**
- **ANTI-PIRACY FROM A GLOBAL PERSPECTIVE**
Mark Mulready, Vice President of Cyber Services, Irdeto
- **FROM COMBATING PIRACY TO THE PROTECTION OF COPYRIGHT OF AUDIOVISUAL WORKS**
Carlos Chelfo, Copyright Protection Coordinator, ANCINE



Diogo Leuzinger, Information Security Coordinator, Globo

An actuary from UFRJ and a master's degree in Administration from COPPEAD/UFRJ, Diogo worked for years at Globo on Digital Transformation projects and has been leading initiatives to combat audiovisual piracy in the area of Information Security for 4 years.



Jonas Antunes, Legal Director, ABTA – Brazilian Pay TV Association

Jonas Antunes Couto is an economist and lawyer, with a doctorate in Economic Law from USP. Today he is ABTA's Legal-Regulatory Director and coordinates activities to prevent and combat audiovisual piracy in the industry.



Moisés Queiroz Moreira, Advisor to Anatel - Anatel - National Telecommunications Agency

Public Manager. In the last 15 years holding public positions in the Federal, State and Municipal Government of the State of São Paulo. I coordinated technical advisory activities at the Consumer Protection and Defense Foundation – PROCON SP and special advisory at the Companhia Metropolitana de Habitação de São Paulo – COHAB and the Legislative Assembly of the State of São Paulo, from 2003 to 2006. In 2006 I took over as head office of the Municipal Health Department of the city of São Paulo. Member of the Board of Directors of SPTURIS – São Paulo Turismo S.A. from April/2008 to March/2009. Since 2015, I have worked in the federal government in the public positions of Special Advisor to the Minister of Cities, Head of Parliamentary Advisory and Special Advisor to the Minister of the Ministry of Science, Technology, Innovations and Communications. I currently hold the presidency of GIRED – Group for Implementation of the Redistribution and Digitization Process of TV and RTV Channels and am a member of the Board of Directors of ANATEL.



Mark Mulready, Vice President of Cyber Services, Irdeto

Mark has over 35 years of combined experience in commercial, legal and law enforcement areas. He leads a global team of analysts, investigators and engineers who provide a range of managed cybersecurity services to protect clients in the video entertainment, video gaming and Internet of Things (IoT) connected device industries. Previously, Mark served as Operational Security and Fraud Prevention Manager at Foxtel in Australia for 8 years, and also served as a Detective and Prosecutor for 16 years with New South Wales Police. Mark holds a Bachelor of Arts and Law from the University of Wollongong and was admitted as a solicitor to the Supreme Court of New South Wales in 2004. He is also currently co-chair of the Audiovisual Anti-Piracy Alliance in Europe.



Carlos Chelfo, Copyright Protection Coordinator, ANCINE

Carlos A. M. Chelfo has been practicing accounting for over 18 years, mostly in public institutions. He is currently a federal public servant. He was Municipal Secretary of Finance, in Machados-PE. In the State of Rio de Janeiro he held the position of Undersecretary of Administration in the Secretariats: Government, Civil House and Penitentiary Administration. At the Federal level, he was Coordinator of Combating Piracy, President of the ANCNE Ethics Committee and Member of the National Council for Combating Piracy, of the Ministry of Justice. He was an instructor in the course on Public Budget, Public Finance, Fiscal Responsibility Law and Ethics in the Public

Sector, at the Higher School of Finance Administration, of the Ministry of Economy. He was also an instructor in the Finance and Financial Administration disciplines at the Federal Rural University of Rio de Janeiro. He taught the subjects of Public Accounting, International Accounting and Controllershship, at Faculdade Mackenzie Rio. Professor accredited with the Regional Accounting Councils: AP, DF, MG, RJ, SP and TO. Master's degree in Accounting Sciences, from UFRJ. Postgraduate in Public Management, from FIJ. Specialist in Administrative Law from Unieducar. Certified in IFRS and NIAs by FIPECAFI/IBRACON/BID. Bachelor of Accounting Sciences from Faculdade Moraes Junior.

STREAMING – MONETIZATION AND FAST CHANNELS

Moderator: Alexandre Britto, President of Abott's – Brazilian OTT Association

- **FAST ECOSYSTEM: A LOOK AT TECHNOLOGY AND INNOVATION**

Speaker: **Marcelo Minami, Solutions Architect | AD-Digital**

FAST channels continue to advance on a global scale, with the expansion of their reach directly impacting the evolution of display and monetization platforms, which are crucial for the success of a respective channel.

This presentation explores two questions: When looking at the FAST ecosystem, what are the key points to explore in this model? And what are the most suitable infrastructures for FAST strategies?

- **CODEC-BASED ADVERTISING TECHNOLOGY: HOW VIDEO CODECS ARE USED IN AD TECH**

Speaker: **Thomas Kramer, VP of Strategy and Business Development, MainConcept**

Ad supported subscriber growth is a hot topic for content owners and broadcasters to reach users in new markets and to monetize their content. Nearly every broadcaster plans to launch free ad-supported events and channels if they haven't already. While the concept of "free TV" is not new, the technology used to support ads hasn't kept pace with the race for higher video quality. The exponential growth of FAST channels has led to mixed approaches for serving ads alongside the content. Many solutions were created with expediency in mind, subordinating the focus on optimal efficiency or performance that goes into established workflows.

Focusing on the codec level within an existing workflow provides new opportunities for engaging ads that are more relevant to the user and less intrusive.

- Speaker: **Carlos Alkimim, Director of Contracts and Distribution, Simba**
- Speaker: **Sérgio Mancera Júnior, CEO of NxTV**



Alexandre Britto, President of Abott's – Brazilian OTT Association

Managing Partner at ABX Consulting - Business and Technology. CEO of PG On - Internet and Digital Services Provider. President of ABOTTs - Brazilian Association of OTTs. Engineer and Business Administrator. Electronic and Computer Engineering from UFRJ, MBA from FGV, Post MBA at IMD Business School. Passionate about business development in Technology, Telecommunications and TV.



Marcelo Minami, Solutions Architect | AD-Digital

Graduated in Systems Analysis, he has more than 29 years of experience in the Broadcast market. In his professional journey he led technical projects, project management, support and implementations. He worked intensively on relevant digitalization projects with large manufacturers and integrators in Brazil and Latin America.



Thomas Kramer, VP of Strategy and Business Development, MainConcept

Thomas Kramer is Vice President of Business Development and Strategy at MainConcept. He has been with the company for nearly two decades and has worked as a software engineer on MainConcept's codec technology, in addition to applications engineering and product management. Prior to joining MainConcept, Thomas served as a consultant, managing a variety of technical development projects in software, banking and archiving.



Carlos Alkimim, Director of Contracts and Distribution, Simba

Graduated in Business Administration, postgraduate in Business Strategy and Human Resources Administration from FGV (Fundação Getúlio Vargas), and postgraduated in Communication and Law in Entertainment, Leisure and Culture from the University Extension Center. With 31 years of experience in the Entertainment sector, having worked in companies such as Globosat, Globocabo Holding, Net Brasil, Viacom Brasil and TAP BRASIL, Brazilian representative of the TAP International Television Association of Programmers. In December 2017, he took over as Director of Contracts and Distribution at SIMBA Content, a Brazilian pay television and streaming programming company (a joint venture formed between the television networks, RecordTV RedeTV and SBT). Carlos Alkimim was also a member of CSC CONSELHO SUPERIOR OF CINEMA and the FAC FORUM OF AUDIOVISUAL AND CINEMA.



Sérgio Mancera Júnior, CEO of NxTV

CEO of NxTV, which develops solutions for Internet Providers - ISPs. These are OTT platforms and applications with integrated content from linear Online TV channels and VODs (Video On Demand). He has worked for over 20 years in the areas of telecommunications and systems and solutions development.

VIDEO CONNECTIVITY: EXPLORING THE POSSIBILITIES OF TECHNOLOGY

Moderator: Robson Tavares, Technical Director at REDE CNT

• PTP – PROVISIONING AND MONITORING

This presentation discusses best practices for configuring, monitoring, and managing a multi-vendor PTP infrastructure and its performance from the PTP grandmaster, across all thresholds and transparent clocks, to the PTP follower nodes, including data from network analyzers to obtain Full visibility of the PTP referral network. This includes monitoring critical network and PTP parameters of all nodes through various APIs, detecting system changes in real-time, and also incorporating additional workflows to add an extra level of security, such as a fully automated onboarding process. of your PTP infrastructure to configure all PTP parameters and proactive testing before a PTP system can be put into operation.
Speaker: **Fabio Acquati**, Chief Technology Officer, NGN Telecom

• THE ROAD TO IP

Challenges of migrating from the world of SDI video to the world of video over IP.
Speaker: **Nestor Amaya**, SVP Solutions Architect, EVS

• Speaker: **Miguel Coutinho**, Head of Strategy at NDI



Robson Tavares, Technical Director at REDE CNT

Robson Tavares, Electronics Technician, Broadcaster and Electrical Engineer with an emphasis on Telecommunications from UFPR (Federal University of Paraná). He has worked in broadcasting since 1981, with experience in all areas of Television Broadcasting, from studio and external recording, production, post-production, archiving, distribution, exhibition and transmission. He began his broadcasting career at TV Cultura in São Paulo, with stints at SBT, video production companies and currently at REDE CNT, in Technical Management, with maintenance work, projects, training, as well as the implementation of Broadcasters and Retransmitters throughout Brazil.



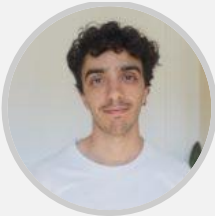
Fabio Acquati, Technology Director, NGN Telecom

He began his career at Tektronix, working as a Video Systems Engineer for South America and, during this period, he followed the evolution and transition of video systems, participating in the first digital TV tests in Brazil. He is currently Director of Technology at NGN Telecom, a company he founded and which works with monitoring, quality assurance and process automation solutions, where he acquired knowledge in the world of IP networks. Participates in the GT IP/Cloud and GT OTT groups, from SET, is an instructor at Globo's technology academy, provides training in the area and studies technology with the manufacturers he represents, participating in implementations and proofs of concept, experiencing the challenges of the world Video, IP, Cloud, workflow orchestration and process automation.



Nestor Amaya, SVP Solutions Architect, EVS

Nestor Amaya has a background in infrastructure and has worked in the broadcast industry for 20 years, contributing to different companies along the way.



Miguel Coutinho, Head of Strategy at NDI

Miguel Coutinho is the Head of Strategy at NDI - the video connectivity technology that connects the video universe. He leads transformation and growth projects, ensuring NDI's expansion across the video ecosystem, working closely with product, sales, marketing and R&D leadership to align execution with NDI's long-term goals. Previously, Miguel led innovation projects for corporations, public institutions and startups in Europe, having worked on service and product design, new business development, policy design and technology implementation. He is one of the founders of Decade Ventures, a startup incubator focused on climate change adaptation solutions. Currently, Miguel is based in sunny Lisbon, where he spends his free time enjoying good food and the Atlantic Ocean.

12:45pm | Room 3 | Monday -7 of August

SET EXPRESS

COME AND DISCOVER REAL-LIFE USE CASES OF HOW AI IS ALREADY IMPACTING THE VALUE CHAIN OF THE MEDIA INDUSTRY. AND WHAT ELSE IS COMING UP AHEAD?

Moderator: Leonardo Chaves, Innovation Lab Manager | Telecom | Globe

• THE FUTURE OF AUTOMATIC AI DUBBING

Speaker: **Kylle Maddock**, SVP Sales and Marketing, AppTek

In this session, we will hear from a leading Artificial Intelligence and Machine Learning company focused on human language technologies on the topic of fully automatic AI dubbing. The presentation will feature a demonstration of speaker-adaptive AI dubbing across multiple languages that automatically retains the speaker characteristics and timing of the original speakers when applied to a target language, a look at how the technology works, the types of quality tiers available with automatic dubbing and how to apply them across media archives, as well as a look into the future of what to expect, and what not to expect, from the technology.

• ARTIFICIAL INTELLIGENCE TO PREDICT STREAMING CONTENT SUCCESS

Speaker: **Claudio Oliveira**, Coordinator of the Digital Transformation Center at ESPM and Partner at Cognitive

Claudio will present the research carried out on simulating the results of streaming content. The researcher started from experimental studies carried out in the classroom, such as the Porta dos Fundos Audience Simulator on Youtube, to more sophisticated projects with support from CNPq and Fapesp, such as the song success simulator on Spotify. The music simulator project analyzed a 6-year history of songs that were part of Spotify's Top 200 and other songs that were not successful to understand the pattern of what makes these songs popular. The artificial intelligence

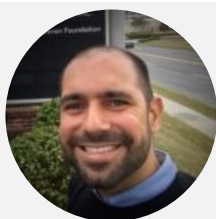
applied to the simulator can measure the success rate with very high precision, providing support for record labels, producers and artists.

The researcher will show the simulator live and show some application examples to the audience.

• WILL CHATGPT KILL JOURNALISM?

Speaker: **Barbara Lins**, CEO, SOUV

The lecture will feature cases in which Artificial Intelligence is already being used in newsrooms around the world. We will bring examples of experiences carried out at the BBC, NHK, NYTimes, The Guardian, among others. Next, we will address the impacts of AI on the future of journalism and the various open questions regarding the disruptive impacts of Generative Artificial Intelligence technologies, both for text, audio, video and graphics. Additionally, topics such as the proliferation of fake news, now enhanced by AIs, and their already perceived impacts on our society will be addressed. Finally, we will present as an alternative the need for journalists to be increasingly aware of how it is possible to use these tools to their advantage and how the concepts of immersion, first-person journalism and storyliving will become even more necessary.



Leonardo Chaves, Innovation Lab Manager | Telecom | Globe

Leonardo recently took over one new area. He is the current Manager of the Innovation Lab with a focus on Telecom, an area that proposes and implements actions that explore new technologies applied to the context of networks for content production, the next generation of TV, and new experiences of media consumption. He is passionate about the innovation process and seeks to accelerate the adoption of disruptive solutions through the external ecosystem, relying on startups, innovation hubs and centers of excellence. He graduated from the Federal University of Rio de Janeiro, where he also completed his master's degree in Engineering in 2013. He has an MBA in business management from PUC-Rio and between 2017 and 2020 he was the coordinator of the Technical Module of the Brazilian Digital TV Forum.



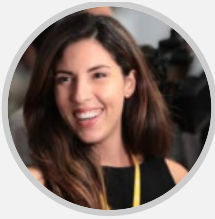
Kyle Maddock, SVP Sales & Marketing, AppTek

Kyle Maddock is the SVP of Sales & Marketing at AppTek, a global leader in Artificial Intelligence and machine learning for Human Language Technologies, including automatic speech recognition, natural understanding language and neural speech synthesis. Kyle has over 25 years of sales experience and is a marketing veteran who has led over a billion in business across consumer and B2B marketing initiatives.



Claudio Oliveira, Coordinator of the Digital Transformation Center at ESPM and Partner at Cognitive

Claudio is Coordinator of the Digital Transformation Center at ESPM (DIGI) and professor of Business Technology and Marketing Science on the Administration course at ESPM. He is responsible for a project sponsored by Fapesp and CNPq on return on investment in marketing in Brazil. Doctor, master and graduate in Production Engineering from Poli USP. Speaker at national and international events. Partner at Cognitive consultancy with over 20 years of experience in Marketing Intelligence.



Bárbara Lins, CEO, SOUV

Bárbara Lins is an award-winning journalist, with experience in renowned media outlets, such as Band News FM, CBN and TV Globo. She graduated and mastered at the University of Brasília, where she was also a professor. Passionate about new technologies, she stands out for applying mobile journalism to national and international coverage, such as the Football World Cup in South Africa and the 70th UN Meeting in NY. He received a scholarship from the Japanese agency JICA, where he studied Digital TV. Currently, she works as a presenter at Nova Brasil FM and as co-founder of the startup SOUV, which develops different solutions for journalists, communication companies and content creators.

PRACTICES AND TRENDS IN THE CREATOR ECONOMY

New tools and platforms are changing the online content creation ecosystem. The relationship of the brands with this market has evolved, with the growth of investment in digital advertising and the so-called influencer marketing. We'll discuss these themes with platforms and creators to understand the challenges and opportunities of these actors and market trends.

Moderator: **Fernanda Siqueira Pinto, Executive Producer**

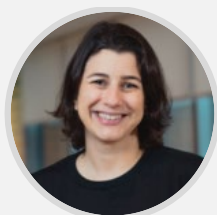
SPEAKERS:

- **Marcelo Minami**, Solutions Architect | AD-Digital
- **Erika Dias**, Head of Creators Ecosystem and Partners, Kwai
- **Manuela Villela**, Head Creator Ecosystem do YouTube Brasil
- **Rafa Dias**, CEO, Dia Estúdio



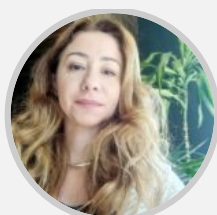
Fernanda Siqueira Pinto, Executive Producer

He has worked for over 20 years in media and entertainment, creating and directing audiovisual content, and executing large-scale projects for companies such as TV Globo, Discovery Channel, Conspiração Filmes, COI and YouTube. He has been working in the creator economy ecosystem for six years, having provided services to YouTube in the development and execution of programs aimed at the development of the platform's content creators.



Erika Dias, Head of Creators Ecosystem and Partners, Kwai

Designer by training and advertising by vocation, he has worked with content for 15 years with stints at Fox, Warner Bros, Discovery and Porta dos Fundos. He has been working at Kwai for two years and recently took over the company's creators and partnerships area, where he is responsible for the entertainment, games, lifestyle, News, telekwai and branded content verticals, with projects such as the exhibition of Formula E on the platform, Tekelwai for Cheetos and Skol.



Manuela Villela, Head Creator Ecosystem at YouTube Brazil

Manuela Villela is the Head Creator Ecosystem of YouTube in Brazil, which has been her home for eight years. His team is responsible for the strategy of the largest gaming, entertainment and lifestyle channels, and more recently has designed the YouTube Shopping strategy in the country. She began her career in 2014, leading the successful YouTube Top Creators and Public Figures project. Before leaving for YouTube, Manuela spent four years at Google, where she worked in the commercial area. Communicative

and easy to deal with the public, she stands out for her unique and innovative strategic perspective in the area of new business.



Rafa Dias, CEO, Dia Estúdio

Rafa Dias has a degree in Television and Cinema in Canada and worked as a program director at MTV. 12 years ago, with the creation of the Programa de 1 Cara Só channel, he began his digital journey, understanding how YouTube works and behind the scenes. Two years later, he officially and professionally migrated his experience in the audiovisual market to the internet. Betting on pioneering, he created Dia Estúdio, a network accredited by YouTube, which in addition to managing channels and managing digital influencers, specializes in producing and carrying out large projects for all social networks. Currently, in addition to being CEO of Dia Estúdio, he is also general director of DiaTV, the first TV made by content creators and with 24-hour daily programming and exclusive transmission over the internet.

2:00pm | Room 2 | Monday – Aug. 7, 2023

CONNECTIVITY

FIGITAL CONVERGENCE IN TELEVISION: AI, 5G, AND SPATIAL COMPUTING REINVENTING PRODUCTION, DISTRIBUTION, AND VIEWER EXPERIENCE

This panel is a direct evolution of last year's event, which focused on the impact of 5G on the media and entertainment industry. However, this year's focus expands far beyond, delving into the futuristic waves of emerging technologies such as 5.5G and 6G, space computing, and the figital world (physical-digital-social).

Key Points:

1. **Enhanced Connectivity:** Explore how 5G, 6G, and VLC are accelerating possibilities in production, transmission, and consumption, serving as the infrastructure pillars of a hyperconnected world.
2. **Artificial Intelligence in Content Production:** Discuss the transformative role of AI in content creation, opening new frontiers of creativity and efficiency.
3. **Augmented and Mixed Reality as Endpoints:** Evaluate how these devices are becoming the new tools for media and entertainment consumption, enriching the viewer's experience.
4. **Monetization and the Entertainment Industry:** Examine how emerging technologies are creating new ways to monetize audiovisual content, reshaping the industry's economy.
5. **Future Vision:** A futuristic perspective on what technological advancement will bring to the figital world, where the physical-digital-social tridimensionality is already beginning to shape new behaviors, and the new digital-native generations Z and Alpha are starting to define future needs.

This year's panel aims not only to look at the present but also to attempt to anticipate the future, exploring the vast possibilities emerging in a rapidly transforming world. The convergence of the physical, digital, and social is no longer a distant vision; it is already here, and this panel is poised to explore this new horizon.

Moderator: Fernando Gomes de Oliveira, CIO of Intellinet Conectividade Inteligente and Chief Growth Officer in the Digilab and RoboYell groups

• COST-EFFECTIVE AND PROFITABLE HIGH-QUALITY VIDEO SERVICES OVER 5G AND 5G-BROADCAST

According to Ericsson, video represents 70% today and 80 in 2027 of data traffic in mobile networks. GSMA forecasts Mobile Network Operators will spend \$720 billion in 5G between 2021 and 2025. The profitability of 5G networks will come thanks to monetization of video services.

To make that happen, solutions are already available today.

To attract and retain end users, the highest video quality and quality of experience can be guaranteed with high Video Quality encoding and broadcast-like latency thanks to Low-Latency CMAF. Immersive experiences can be created thanks to three-dimensional audio protocols such as MPEG-H. Monetization, and cost-effectiveness, will ensure profitability. Dynamic Ad Insertion is now ready to help service/content providers monetize their video services in 5G.

Speaker: **Williams Tovar**, 5G Media Streaming Solutions Director na ATEME

- Speaker: **Arismar Cerqueira S. Jr.**, R&D | Telecommunications Engineer | Ph.D.
- Speaker: **Uirá Moreno Rosário and Barros**, Telecom Analyst – Strategy and Technology | Globe
- Speaker: **Carlos Alberto S. Camardella**, Telecommunications Engineering Consultant – Embratel



Fernando Gomes de Oliveira, CIO at Intellinet Conectividade Inteligente and Chief Growth Officer at the Digilab and RoboYell groups

CIO of Intellinet Conectividade Inteligente and Chief Growth Officer in the Digilab and RoboYell groups, dedicated to the areas of 5G and 6G networks, Artificial Intelligence, Cybersecurity and Smart Cities. Its activities are focused on helping companies incorporate emerging technologies in different sectors, helping them evolve and adapt in the Digital Era. He is an active member of committees at the International Association for Artificial Intelligence (IAAI), where he coordinates the Committee on AIoT & Robotics, demonstrating his commitment to constant innovation and the practical application of AI. He is also a member of StartSe's community of innovative Game Changers, positioning himself at the forefront of digital transformation. As an Angel Investor at Poli Angels, you support the new generation of disruptive companies that are redefining traditional industries. As an Advisor to OLA-CCI and leader of ACATE's 5G Working Group, he is constantly looking for ways to drive innovation and technological development, always with the vision of building a more efficient, sustainable and connected future. Talks about the digital world, innovation, disruptive technologies, people, Web3, Blockchain, media and entertainment, Artificial Intelligence, 5G/6G, IoT and Smart Cities.



Williams Tovar, 5G Media Streaming Solutions Director at ATEME

Williams led the company's success in receiving the 5G Media Streaming Solution award at IABM 2023. He is also dedicated to ensuring customer satisfaction and that Ate me continues to be at the forefront of 5G innovation for video streaming. Williams brings more than 20 years of experience in mobile and data networks, previously working with industry leaders including ENENSYS and Alcatel. Furthermore, he is fluent in English, French and Spanish and has a master's degree in electronic engineering from INSA (Rennes, France) and an MBA from the Rennes School of Business.



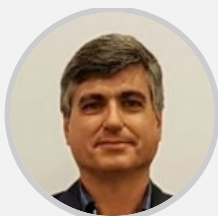
Arismar Cerqueira S. Jr., R&D | Telecommunications Engineer | Ph.D.

Telecommunications Consultant, Research Productivity Researcher at CNPq, Level 1D and Adjunct Professor V at the National Telecommunications Institute (INATEL). Graduated in Electrical Engineering from the Federal University of Bahia (2001), Master's degree in Electrical Engineering from Unicamp (2002), Ph.D. in Telecommunications Engineering from Scuola Superiore Sant'Anna - Italy and University of Bath - England (2006), and Post-Doctorate in Electrical Engineering from Unicamp (2009). From March 2009 to August 2011, he was a public professor at Unicamp in the area of Telecommunications. He worked as Invited Researcher and/or Invited Professor at internationally renowned universities, such as University of Oulu-Finland (2017), Technical University of Denmark-Denmark (2013), Max Planck Institute-Germany (2010), University of Bath - England (2004, 2005 and 2007) and Scuola Superiore Sant'Anna - Italy (2015, 2017 and 2019). Its main research areas are: 5G, 6G, Antennas, Artificial Intelligence, Internet of Things (IoT), Microwave Photonics, Optical Communications and Radars. Arismar has 12 patents, 31 products transferred to industry and more than 300 articles published in international and national journals and conferences.



Uirá Moreno Rosário e Barros, Telecom Analyst – Strategy and Technology | Globe

Uirá Moreno Rosário e Barros has a master's degree in Electrical Engineering with an emphasis on Telecommunications from Universidade Mackenzie, and is currently a PO at Globo's Telecom Innovation Lab, focusing on the Future of Connectivity and Content Distribution Networks. As highlights of innovation cases, he was responsible for the First Immersive Commercial Live Audio Broadcast on ISDB-T and 5G applications at BBB, Carnival, Rock in Rio, Multishow Music Award and Presidential Inauguration. He is also a Professor of Radio, TV and Internet at Faculdade Cásper Líbero and a member of the TV 3.0 Working Group at SET, as coordinator of the Immersive Audio theme.



Carlos Alberto S. Camardella, Telecommunications Engineering Consultant – Embratel

Training in Electrical Engineering, with emphasis on Electronics and Systems, and subsequent specialization in Telecommunications, from the Pontifical Catholic University of Rio de Janeiro (PUC-RJ). He began his professional life in Brazilian military projects, as a designer of radar systems and weapons controls. In the telecommunications area, he joined Embratel in 1999, working on the implementation of the first ATM and Backbone IP / Internet data networks, on the implementation of the first transport network for digital video signals contributed to TV stations at national level (SmarTVideo) , in the design of the new IP video network for contribution to TV broadcasters (EvSOL) and in the testing and implementation of the first WiMax, Metro

Ethernet and GPON networks. Integrated into the Technological Evolution area, he has always worked on the development of new products and services, such as telephony NGN and Netfone, and research and development of new technologies such as IoT, SDN, HFC, eMBMS (LTE Broadcast), NFV/Virtualization, Orchestration, 4.5G and 5G for the Claro group. Coordinated with Claro Anatel's coexistence tests between 5G in the 3.5GHz band and satellite TV reception systems in Band C. - Participated in the Frequency Committee of the 5G Brazil Project, as one of the rapporteurs, and is part of the delegation Brazilian at the ITU (ITU). Member of the GT-Desocupação (Technical Group for Eviction of the 3.5 GHz band and Interference Mitigation) of GAISPI/ANATEL (Group for Monitoring the Implementation of Solutions for Interference Problems in the 3,625 to 3,700 MHz band) since its creation .

2:00pm | Room 3 | Monday – Aug. 7, 2023

SECURITY

RISKS OF ARTIFICIAL INTELLIGENCE AND DEEPPFAKE FOR THE MEDIA AND ENTERTAINMENT INDUSTRY

In this panel, we will show how the use of AI and deepfake has developed, the security implications and threat scenarios it can bring to our media context. We will also demonstrate the potential use of this type of technology.

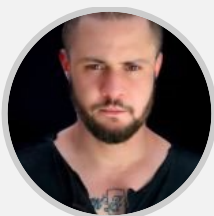
Moderator: Diego Piffaretti, Offensive Security Leader (Red Team) - Globo

- Speaker: **Fernando 3D**, Digital Art Director and CMO at FaceFactory.AI
- Speaker: **Thiago Labliuk**, Managing Partner at KPMG Brasil



Diego Piffaretti, Leader of Offensive Security (Red Team) - Globo

Piffaretti has a degree in Computing and is currently studying a master's degree in computing at the Instituto Militar de Engenharia (IME). has extensive experience in IT, with 12 years of experience in information security, with an emphasis on offensive security, acting as an ethical hacker in several clients and segments, experience with intrusion tests in ATM (ATM), networks, infrastructure and applications. He has been carrying out personal research on deepfake since 2019. At Globo he works as technical leader of the offensive security team, a team made up of "good hackers", working with invasion tests and supporting other areas as a technical reference on the topic of cybersecurity.



Fernando 3D, Digital Art Director and CMO at FaceFactory.AI

Fernando Rodrigues de Oliveira, known as Fernando 3D, together with Bruno Sartori, are one of the pioneers of deepfake and artificial intelligence in entertainment in Brazil. Fernando 3D, together with other producers, was responsible for producing the music video by Brazilian duo Tropkillaz entirely made with the deepfake technique, the first made in Brazil. This is the first music video made with Artificial Intelligence and Deepfake in the country. Graduated in 2007 from the Panamericana School of Arts. Fernando began working with 3D modeling and 2D animation at Fábrica de Quadrinhos, a production company founded by the brothers Piologo (Ricardo and Rodrigo) and Rogério Vilela, creators of the website Mundo Canibal, now extinct. He also worked with other famous Brazilian celebrities, YouTubers and influencers. Graduated in Digital Design (Unibero Anhanguera - Bachelor's degree). Advertising Design Technician (Escola



Panamericana de Artes). Today on the internet he is known as Fernando 3D, a nickname given by Irmãos Piologo and Rogério Vilela.

Thiago Labliuk, Managing Partner at KPMG Brasil

Thiago Labliuk is Managing Partner at KPMG Brasil, working in Managed Services for Risks and Cybersecurity. A strategist for Integrated Risk Management, working for more than 10 years in matters related to risk management, including Cybersecurity and Fraud Prevention, with extensive experience in leading projects that have already impacted more than 10k professionals, delivering important developments for management more efficient and connected risk management, ranging from mechanisms for identifying risks and anomalies, to automatic mechanisms for assessing exposure and responding to risk. His background includes technology, economics, statistics and data science & analytics. Programmer by passion and great supporter of data analysis to generate insights for business. Among the segments in which it has been operating, we can highlight: Mining, Logistics, Banking, payment methods, Insurance and Food Industry.

PROGRAMMATIC MEDIA: NEW OPPORTUNITIES FOR THE TV ENVIRONMENT

The TV environment gained new entrants with other business models and content distribution such as AVOD and Fast Channels. And with technological and platform advances we have a scenario in which CTV and Streaming become increasingly present in video consumption in the TV environment.

Furthermore, how traditional M&E and Broadcasting players are structuring themselves to shift their content consumption from linear to streaming and becoming increasingly digital. In this panel we will discuss how programmatic media will be the basis for this new business model and how our market is preparing for these changes.

Moderator: **Breno Barcelos, Display & Video 360 Product Lead at Google**

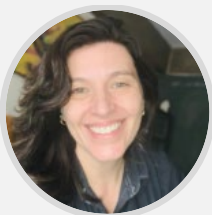
SPEAKERS:

- **Karin Ribeiro, Digital Business Manager, SBT**
- **Rafael Pallares**, Vice President, Latin America at Magnite
- **Denis Onishi**, Senior Business Director na Paramount



Breno Barcelos, Display & Video 360 Product Lead at Google

Breno Barcelos is a specialist in programmatic media and digital marketing with more than 10 years of experience and working on both sides of the industry, sell side and buy side. President of the Programmatic Media Committee at IAB Brasil and professor of the Programmatic Media courses at IAB Brasil since 2020. He has been at Google for 6 years and is currently Display & Video 360 Product Lead focusing on the development of new CTV and DOOH formats.



Karin Ribeiro, Digital Business Manager, SBT

Karin Ribeiro is a Digital Marketing specialist with more than 15 years of experience in sales and development of digital products. She currently leads the Digital Business area at SBT and is a professor of Programmatic Media at IAB. With expertise in vehicle monetization and a solid professional background acquired in a digital agency, technology and vehicle company, Karin offers strategic solutions in planning, sales, digital marketing, digital product development and pricing. Her results-oriented approach and passion for innovation make her a highly qualified professional in the Digital Universe.



Speaker: Rafael Pallarés, Vice President, Latin America at Magnite

As Vice President, LATAM at Magnite, Rafael Pallarés drives the company's growth in the region. Previously, he was GM of Latin America at Telaria, prior to the company's merger with Rubicon Project to form Magnite. Rafael has held several leadership positions in innovative and fast pacing companies, at the intersection of media, technology and advertising, in Brazil and the United States. He is also an angel investor in start-ups. He has a degree in Advertising and a stricto sensu master's degree in Business Administration.



Denis Onishi, Senior Business Director na Paramount

Denis Onishi is a professional known for his data-driven approach to decision-making. With a solid background in Adtech and Martech, Denis excels in leveraging data to optimize marketing efficiency, and also for his expertise in Media Strategy, covering Media Mix Modeling, Evaluation, Data Analysis and Performance. Passionate about the customer experience, Denis strategically drives business growth by prioritizing positive interactions. Your ability to work seamlessly across departments shows your versatility and aptitude for cross-functional collaboration. Within data-driven decision-making, Adtech and Martech, Denis Onishi is an influential presence, shaping strategies, inspiring teams and delivering impactful results.

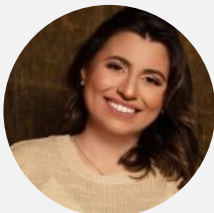
THE NEW TECHNOLOGIES THAT ARE DRIVING THE STREAMING MARKET

With the growth of the streaming market, we are witnessing an increasing need to enhance the user experience, whether through a wider offering of 4K content, reduced delay for live sports, or the introduction of channels in a new business model known as “fast channels” (Free Ad-Supported Streaming Television). This model stands out for offering channels for free with advertising via streaming. All these advancements bring complexity across the entire encoding, packaging, distribution, and operational platforms.

This panel will discuss the technologies and operational models being considered and adopted to achieve greater efficiency and ensure a better user experience.

Moderator: Carolina Duke, Senior Technology Manager, TV Globo

- Speaker: **Marcos Sant'Anna**, Digital Projects and Products Coordinator, Globo
- Speaker: **Manfred von Runkel**, Lead Solutions Architect at Bitmovin
- Speaker: **Ronaldo Dias**, Sales Director for Americas - Amagi



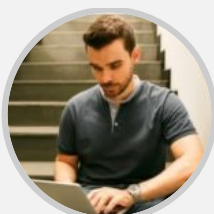
Carolina Duca, Senior Technology Manager, TV Globo

Engineer and Master in Digital Transmission Systems, she has been working for over 10 years in the area of content production and distribution. He is currently responsible for Globo's telecommunications area.



Marcos Sant'Anna, Digital Projects and Products Coordinator, Globo

Digital Projects and Products Coordinator, graduated in electronic engineering from Gama Filho University. He has extensive experience in network architecture projects, servers, storage, datacenter and video infrastructure. He currently leads a team of 13 Product Owners who create and execute strategies on Globo's digital platforms and products, involving the distribution flow of digital media. Has strong knowledge in encoding, packaging and CDN.



Manfred von Runkel, Principal Solutions Architect at Bitmovin

Manfred is a Principal Solutions Architect specializing in enabling clients, including video and software engineers, to achieve the best results on OTT streaming platforms. He has postgraduate degrees in software architecture and data science, in addition to being a certified specialist in Microsoft Azure Solutions Architect. With 15 years of experience in the technology field, he has worked as a software engineer, cloud architect and software

manager. He has complete proficiency in Portuguese, English, German and Spanish, which allows him to meet the needs of international clients.



Ronaldo Dias, Sales Director for Americas - Amagi

Ronaldo Dias is Sales Director at Amagi, where he is responsible for the Hispanic and Faith & Family segments in the Americas. With over 15 years of experience in the media and entertainment market, Ronaldo is involved in all stages of the business supporting the broadcast journey to the cloud and FAST opportunities from content creation, distribution and monetization. Prior to this role, Ronaldo held the positions of Director of Sales and Business Development at Ericsson/MediaKind, Director of Strategy and Business Development at SondaIT and Director of Broadcast and Cable Solutions at Harmonic. Ronaldo has a degree in Electrical Engineering from the Faculty of Industrial Engineering (FEI), Brazil, and a postgraduate degree in finance and marketing (MBA/CEAG) from Fundação Getúlio Vargas (FGV), Brazil.

INFORMATION SECURITY BEST PRACTICES FOR CONTENT SECURITY

In this panel, we will discuss best practices for cybersecurity and information security, including the recent updates to ISO 27001, 27002 standards, and the Motion Picture Association's (MPA) Best Content Security Practices. We will also explore the benefits that certification and an enhanced level of security maturity can bring to the media and entertainment industry.

Moderator: Vinícius Brasileiro, Information Security Manager – Strategy & Risk, Globo

SPEAKERS

- **Kari Grubin**, Director, Motion Picture Association Trusted Partner Network
- **Ariosto Farias Jr.**, Consultant, CQSI-Information Management and Security Consulting
- **Lucas Bortolato**, CTO/CISO da Every System Companand
- **Daniel Tupinambá Gonçalves**, Partner, Deloitte



Vinícius Brasileiro, Information Security Manager – Strategy & Risk, Globo

Bachelor's degree in IT and Accounting Sciences, specializing in IT Auditing and certified as Certified Information Systems Auditor (CISA), Certified Information Security Manager (CISM) and Certified in Risk and Information Systems Control (CRISC) by ISACA, Certified Chief Information Security Officer (CCISO) by EC-Council and Certified Business Continuity Professional (CBCP) by DRI International, Vinícius has 20 years of experience in the areas of information security, governance, risk and compliance. He is currently Coordinator of the Information Security GT at SET, vice-president of the ISACA Rio de Janeiro Chapter, guest professor at PUC-PR and leads the Security and Risk Strategy area at Globo.



Kari Grubin, Diretora, Motion Picture Association Trusted Partner Network

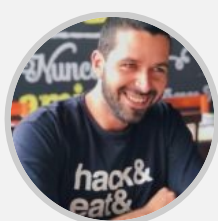
Kari Grubin has spent the last 25 years leading and managing studio divisions, global post-production facilities, corporate departments, and groups within commercial organizations. Kari is the Director of Membership Services for the Motion Picture Association's Trusted Partner Network and is a member of the Academy of Motion Picture Arts and Sciences, serving on the Executive Committee of the Production and

Technology Branch. Kari's previous roles include leading SMPTE's RIS OSVP Initiative and serving as Vice President of Mastering at Walt Disney Studios.



Ariosto Farias Jr., Consultant, CQSI-Consultancy in Information Management and Security

Expert and Leader of the Brazilian Delegation (HoD), from the year 2000 to the present date, in the International Committee ISO SC 27- Information security, cybersecurity and privacy protection, responsible for preparing the ISO 27001:2022 and ISO 27002:2022 standards; -Coordinator of the ABNT CE 021.027 Commission, responsible for the adoption in Brazil of the NBR ISO 27001, NBR ISO 27002 and other ISO 27000 Family Standards; -Senior Consultant, since 2001, of the ISO 27001 and ISO 27002 Standards, having advised several companies in the implementation and certification of ISO 27001; - Certified ISO/IEC 27001 Senior Lead Auditor by PECB (Canada) - Civil Engineer graduated from the UFBA Polytechnic School.



Lucas Bortolato, CTO/CISO at Every System Company

As CTO/CISO of Every System Company since 2017, with my team I developed several highly complex and security projects following the best practices of agile methodology using tools such as scrum, kanban, heijunka, kaizen, 5S. PROJECTS: Construction of high-performance and high-availability data centers; Operational redundancy projects; Physical and logical security; Black, gray and white box intrusion and security tests; Performance tests; Implementation of compliances such as SOC-1, SOC-2, PCI-DSS, TPN (MPAA), ISO 27001/27002, HIPPA; Development of scalable and secure critical applications; Anti-fraud projects; Implementation of security projects.



Daniel Tupinambá Gonçalves, Partner, Deloitte

Cyber Forensics leader with experience in industry and consultancies. He was a global CISO and executive of important players with a strategic and consolidated technical profile. He served as an advisor to more than 30 CISOs and CROs from large organizations, foundations and governments in Brazil. Globally, he participated in technological transformation, cyber, aviation safety and military missions in countries such as: United States, France, Sweden, Portugal, Netherlands, Singapore and England.

THE TV 3.0 PROJECT FOR BRAZIL

SET has been discussing TV3.0 for a few years. Recently, the topic gained prominence with the publication of the national public policy in April. This policy set a new standard for the debate on the TV of the future and created a timetable of decisions that will shape the implementation of this new system. In this special session of the congress, important actors from the sector are participating, such as the Ministry of Communications (MCOM), the National Telecommunications Agency (ANATEL), and the SBTVD Forum (Brazilian Digital TV System Forum). Acknowledging the technical, regulatory, and economic challenges of this transition, the session will delve into the understanding of what has already been accomplished so far and discuss the next steps to achieve TV3.0 in Brazil.

Moderator: Roberto Dias Lima Franco, Advisor to SET and Director of institutional and regulatory affairs at SBT

Speakers:

- **Juscelino Filho**, Minister of Communications
- **Moisés Queiroz Moreira**, Advisor to Anatel - Anatel - National Telecommunications Agency
- **Raymundo Barros**, President of the Brazilian Terrestrial Digital TV System Forum (SBTVD) | SET advisor
- **Flávio Lara Rezende**, President of ABERT
- **Márcio Silva Novaes**, President of ABRATEL



Roberto Dias Lima Franco, Advisor to SET and Director of institutional and regulatory affairs at SBT

Graduated in electrical engineering with a focus on electronics and telecommunications from the Federal University of Bahia and a postgraduate degree in Marketing and Business Management from FGV and ESPM. During his career, he was responsible for the design and implementation of several radio and television companies in Brazil. He was President of SET – Brazilian Society of Television Engineering from 2002 to 2008 and President of the Brazilian Digital TV System Forum from 2005 to 2008 and from 2015 to 2017, after this period he joined the Board of both Entities. In 2009, he was part of the ANATEL Advisory Council, in August 2012, he took office on the Social Communication Council until 2017 and is currently Head of Institutional and Regulatory Affairs at SBT.



Juscelino Filho, Minister of Communications

José Juscelino dos Santos Rezende Filho is a doctor, specialized in radiology, and federal deputy re-elected by the state of Maranhão, in 2022, for his 3rd term. In the Chamber of Deputies, Juscelino Filho presided over the Ethics Council in 2019 and 2020. He was rapporteur for the Budget Guidelines Law (LDO) of 2022. He presided over the Social Security and Family Commission (CSSF) and the Special Commission on Health Technological Innovation (Cetecsau). He participated in some parliamentary fronts related to the Communications sector, such as the Defense of Brazilian Cinema and Audiovisual and the Parliamentary Front to Combat Piracy. He also spoke out in defense of digital health policies. Another proposal reported by the Maranhão resident was the one that updated and modernized the Traffic Code.



Moisés Queiroz Moreira, Advisor to Anatel - Anatel - National Telecommunications Agency

Public Manager. In the last 15 years holding public positions in the Federal, State and Municipal Government of the State of São Paulo. I coordinated technical advisory activities at the Consumer Protection and Defense Foundation – PROCON SP and special advisory at the Companhia Metropolitana de Habitação de São Paulo – COHAB and the Legislative Assembly of the State of São Paulo, from 2003 to 2006. In 2006 I took over as head office of the Municipal Health Department of the city of São Paulo. Member of the Board of Directors of SPTURIS – São Paulo Turismo S.A. from April/2008 to March/2009. Since 2015, I have worked in the federal government in the public positions of Special Advisor to the Minister of Cities, Head of Parliamentary Advisory and Special Advisor to the Minister of the Ministry of Science, Technology, Innovations and Communications. I currently hold the presidency of GIRED – Group for Implementation of the Redistribution and Digitization Process of TV and RTV Channels and am a member of the Board of Directors of ANATEL.



Raymundo Barros, President of the Brazilian Terrestrial Digital TV System Forum (SBTVD) | SET advisor

Executive Director of Technology Strategy at Globo, Raymundo Barros is in charge of the areas of corporate strategy, partnerships and ecosystems, in addition of technology. At the company, the executive led initiatives of great relevance to the media sector, such as the Project to expand the digitalization of analogue signals in Brazil, the implementation of IP infrastructure, 4K in the production and distribution of content, Globoplay and the integration of the areas of technology from Grupo Globo companies. He is currently responsible for implementing Globo's D2C, Adtech and Data Monetization strategy. Raymundo has been at Globo for 39 years. Before assuming the role of CTO/CSO of the company, Raymundo worked as a technician, engineer, operations manager and, later, director of Engineering in SP. He also held the position of Director of Entertainment Technology, where he led projects for soap operas, series and variety programs.



Flávio Lara Rezende, President of ABERT

Lawyer and journalist, with a postgraduate degree in Financial Administration and an MBA in Finance, Flávio Lara Resende assumed the presidency of the Brazilian Association of Radio and Television Broadcasters (ABERT) in August 2020. In 2022, he was reappointed to the position for a new period of two years. Vice-president of Institutional Affairs and general director of Grupo Bandeirantes de Comunicação, he also holds the positions of general director of TV Bandeirantes and Rádio Bandnews. At the International Broadcasting Association (AIR), an entity that brings together 17 thousand radio and television stations from the Three Americas, he holds the position of vice-

president. He is also a member of GIRED (Redistribution and Digitalization Process Implementation Group) of the National Telecommunications Agency (Anatel); GAISPI (Group for Monitoring the Implementation of Solutions for Interference Problems in the 3.5 GHz band) from Anatel; of the Superior Council of CONAR (National Council for Advertising Self-Regulation), of the Superior Council of CENP (Executive Council of Standard Norms) and full member of the Social Communication Council of the National Congress. Flávio Lara Resende held positions in the federal and Minas Gerais governments, in addition to being Cultural and Information Attaché at the Brazilian Embassy in London, England.



Márcio Silva Novaes, President of ABRATEL

Lawyer, journalist and postgraduate in Civil Law. Born in Paraguaçu Paulista (SP), he has been an executive at Grupo Record since 2006. He was responsible for implementing the Social Communication Center of the Federal Court of the State of São Paulo, and worked in strategic communication for several state and national bodies for more than twenty years. He was an advisor to the Social Communication Council of the National Congress and a member of the Freedom of Expression Committee of the Federal Council of the OAB. He is currently president of the Brazilian Radio and Television Association - ABRATEL and institutional superintendent of Grupo Record.

USE OF AI IN CONTENT PRODUCTION

Artificial intelligence (AI) is revolutionizing various industries, bringing new possibilities for innovation, optimization, automation, and also raising new ethical challenges and dilemmas. In the media industry, it is no different – numerous solutions have emerged in recent years, and with the popularization of AI-based technologies, such as LLM and Generative AI, the quality of results and practical application of these technologies are becoming a reality. In this panel, we will discuss the concept of AI and Generative AI in the media industry, as well as technologies and practical applications.

Moderator: Fernando Castelani, Cloud Consulting Account lead, Google Cloud

Speakers:

- **Miguel Dorneles**, Business Development, LATAM - Respeecher
- **Rafael Moraes Pires Vieira**, Co-Founder/Executive, isportistics
- **Gabriel Carvalho**, Key Account Director- Google Cloud



Fernando Castelani, Cloud Consulting Account lead, Google Cloud

With more than 20 years of experience in the Media industry, working on large-scale digitalization and digital transformation projects, he worked for companies such as Harris (Imagine), developing modernization projects for several media groups in Brazil. He later led technology teams at the Disney Group, and is currently developing activities on Google Cloud related to the adoption of the Cloud as a transformational tool for traditional Media Supply Chain flows, with a focus on improving efficiency, scalability, culture and innovation.



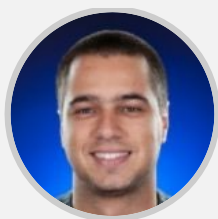
Miguel Dorneles, Business Development, LATAM - Respeecher

For almost 20 years working with Growth in media and technology companies, he led strategies and business operations for companies such as Grupo RBS, Fox, Facebook, Wunderman, Zynga and startups in Latin America, USA and Europe. Currently, as part of its market development office, FlorianX, exclusively represents in Latin America Respeecher, a Ukrainian voice cloning startup, which uses AI and machine learning to produce synthetic voices and replicate voices through speech technology. proprietary to-speech.



Rafael Moraes Pires Vieira, Co-founder / Executive, isportistics

Rafael Vieira is one of the co-founders of isportistics, where he has led product, business and marketing teams for the last 5 years. An economist by training, previously founding isportistics, he had a career spanning almost two decades in the capital markets, occupying leadership positions in funds and banks in the areas of private equity, mergers & acquisitions and equity research. Currently, as an entrepreneur, digital product strategist and investor, he participates in numerous projects in the media tech and artificial intelligence sector.



Gabriel Carvalho, Key Account Director- Google Cloud

Gabriel Carvalho is the Executive Director responsible for servicing and executing the partnership with Grupo Globo. Having been at Google for 9 years, he has worked in several areas such as Business Development in Latin America on the Google Maps platform and led digital transformation and innovation projects through Cloud Computing. Bachelor in Geography from the Pontifical Catholic University of São Paulo (PUC-SP) and Master in Engineering with a focus on Information Systems from the Polytechnic School of the University of São Paulo (Poli-USP), he worked at Hexagon Brasil for more than 9 years, developing solutions in the Geotechnology market for different verticals such as Oil, Gas, Mining, Government and Public Security.

EDUCATION OF THE FUTURE

Artificial intelligence (AI) is revolutionizing several industries, bringing new possibilities for innovation, optimization, automation, and also bringing new challenges and ethical dilemmas. The media industry is no different – countless solutions have emerged in recent years, and with the popularization of technologies based on AI, LLM and Generative AI, the quality of results and the practical application of these technologies are beginning to become a reality. In this panel we will address the concept of AI and Generative AI in the Media industry, as well as technologies and practical applications.

Presenter: Wagner Kojo, SET Advisor and SET eXperience Full Connect Curator

- **HOW TO PREPARE THE NEW GENERATIONS OF STUDENTS AND TEACHERS FOR 21ST-CENTURY EDUCATION?**

Keynote Speaker, Moderator: Zé Luiz Nogueira, Chief Executive Officer, Cientik

Challenges and opportunities regarding a country in transformation!

How are we preparing our talents for the future of the digital economy?

What is the role and relationship between private and public initiatives?

How can the use of technology lead to a leap in education in Brazil and the transformation of students and teachers?

- **Debater: Ewerton Fulini**, Vice-President, Ayrton Senna Institute
- **Debater: Affonso Nina**, President of Brasscom Association of Information and Communication Technology (ICT) and Digital Technologies Companies
- **Debater: Bruno Lopes Correia**, Deputy Secretary of Education at São Paulo City Hall
- **Debater: Hugo Nepomuceno**, Municipal Sub-Secretary of Education of Rio de Janeiro



Wagner Kojo, SET Advisor and SET eXperience Full Connect Curator

With consistent experience in business, marketing, innovation and technology over the last 10 years, he has assumed leadership positions in reference companies in the Technology and Communication sectors. Advisor, Consultant, Angel Investor, Curator and Speaker, Kojo, is also very close to the startup and digital business ecosystem and collaborates with strategic initiatives involving business schools, management and leadership, such as Inova Business School, FDC, HSM, MIT and INSEAD. Graduated in Marketing and Communication from Universidade Paulista, MBA from Business School São Paulo, specialization in International Business at UPC Barcelona Tech, post-MBA in TrendsInnovation and TrendsInnovation Advisor from Inova Business School and Member of ACTIB – Association of TrendsInnovation Advisors of Brazil.



Zé Luiz Nogueira, Chief Executive Officer, Cientik

José Luiz Nogueira studied economics and journalism at PUC-SP, cinema at the Berkeley Film Institute, in San Francisco. He created and produced many educational series for television, such as Tele Curso do Segundo Grau, for the Roberto Marinho Foundation, programs for TV Cultura, Canal Futura, TV Escola, several documentary series for Rede Globo. Partner at Fabrika Filmes, after having written and directed hundreds of TV programs and commercials, he began to dedicate himself solely to education. He coordinated the “Space Robotics” program created in partnership with the University of Brasília and FNDE, with the participation of the Brazilian Space Agency. In the search for solutions that meet the World Bank's Low Cost Education guidelines, he began leading a multidisciplinary team to create an OTT streaming channel focused on public education. This is how Cientik was born, which today has the participation of more than 68 masters and doctors, focusing on teaching new digital technologies to students and training teachers.



Ewerton Fulini, Vice-President, Ayrton Senna Institute

Ewerton is the current Vice-President and spokesperson for the Ayrton Senna Institute, bringing with him more than 15 years of experience in private companies, with expertise in the areas of Business, Human Resources and Corporate Management. His transition to the third sector is a reflection of his passion for human development and search for purpose. He has a degree in Social Communication, an Executive MBA from Insper, a Master's in Leadership from Dom Cabral with an extension at the Kellogg School, and also has 4 trainings in Coaching.



Affonso Nina, President of Brasscom Association of Information and Communication Technology (ICT) and Digital Technologies Companies

Affonso Nina is the Executive President of Brasscom (Association of Information and Communication Technology (ICT) and Digital Technologies Companies), where he was also a member of the Board of Directors. He has 35 years of experience in the areas of Information Technology and Financial Services, having been CEO and Chairman of the Board of Directors of several companies in the private sector. He worked in companies such as Grupo Sonda Brasil, HP (Hewlett-Packard), EDS (Electronic Data Services), GE (General Electric), Carlson Wagonlit, Genpact, Grupo Pão de Açúcar and Booz-Allen. He is also an investing member of BR Angels. He has a degree in Electronic Engineering from the Technological Institute of Aeronautics (ITA), an MBA from Columbia University (Columbia Business School) and Certification as a Counselor from the Brazilian Institute of Corporate Governance (IBGC).



Bruno Lopes Correia, Deputy Secretary of Education at São Paulo City Hall

Master in Human and Social Sciences (UFABC) and bachelor in International Relations (FASM) and in Public Policy Management (USP). He worked for 12 years in the Government of the State of São Paulo in various bodies, such as the Administrative Development Foundation (FUNDAP), the São Paulo Metropolitan Planning Company (EMPLASA) and the Companhia Paulista de Parcerias (CPP). He was President of the

Real Estate Council (2019-2021) and Undersecretary for Government Actions at the Government Secretariat (2021-2022). He works as a Public Policy and Government Management Analyst (APPGG) at São Paulo City Hall.



Hugo Nepomuceno, Municipal Sub-Secretary of Education of Rio de Janeiro

Teacher of basic education at the City Hall of Rio de Janeiro/RJ, where he is Undersecretary for Articulation and Network Integration, at the Rio de Janeiro Municipal Department of Education. His career as a public manager in Education began in 2010, where he served as school director, regional education coordinator and undersecretary, in the current administration of Mayor Eduardo Paes, with Secretary Renan Ferreirinha heading the education portfolio. It is responsible for the organization and integrated communication of the education network, which comprises more than 1549 teaching units, and for supporting school management, through school security and student protection actions. Specialist in Asset Management in Public Organizations (Unyleya), graduated in Pedagogy (UERJ) and History (UFRJ).

DIGITAL TRANSFORMATION OF THE MINISTRY OF COMMUNICATIONS

In this session, the Ministry of Communications will present the evolution of its computerized systems, which are being developed within the scope of the Digital Transformation Program.

Speaker: Thiago Aguiar Soares, General Coordinator of Innovation, Regulation and Systems - Broadcasting Secretariat, Ministry of Communications



Thiago Aguiar Soares, General Coordinator of Innovation, Regulation and Systems - Broadcasting Secretariat, Ministry of Communications

Thiago Aguiar Soares has a degree in Electrical Engineering from the University of Brasília (UnB), a postgraduate degree in Telecommunications Regulation from the National Institute of Telecommunications (Inatel) and a master's degree in Electrical Engineering from UnB. He worked at the National Telecommunications Agency (Anatel) for 12 years, coordinating projects in digital television, digital radio, spectrum management, technical regulation of broadcasting services, implementation of IT systems, among others. Since 2020, he has been General Coordinator of Innovation, Regulation and Systems at the Broadcasting Secretariat of the Ministry of Communications. Thiago is vice-president of Study Committee 6 (Radiobroadcasting) of the Radiocommunications Sector of the International Telecommunication Union (ITU-R).

PRODUCTION

Moderator: Esdras Miranda, Director of Technology and Operations at Sistema Jangadeiro de Comunicação

- **METAHUMANS & DIGITAL DOUBLES**

Speaker: **Karlos Rabello**, Sales Manager for Latin America and the Caribbean, disguise

What if you could accurately simulate a major football match in a virtual environment and view your favourite moments of the game at a level of detail that would have been impossible through a traditional broadcast? With today's advances in game engine graphics, with realistic 3D humans, or MetaHumans, that future is closer than you'd think.

In this presentation, we will critically investigate how MetaHumans and digital doubles are changing sports broadcasts today, and explore the possibilities that they'll bring to future match day coverage.

- **HDR PRODUCTION – TONE MAPPING TECHNIQUES AND ROUND-TRIP CONVERSION PERFORMANCE**

Speaker: **José Filipe Ferraz Valente**, Video Standards Engineer - Philips

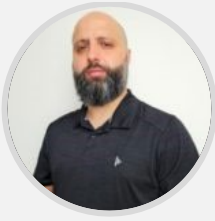
Historically, the color and contrast limitations of SDR have forced content producers to make difficult choices, while HDR gives them greater freedom to tell their stories with greater flexibility. However, HDR presents its own challenges: the different characteristics between HDR monitors conflict with optimal reproduction of SDR or HDR content on any screen. Tone mapping addresses this issue by compressing HDR to SDR (or to lower luminance HDR), or vice versa, expanding.

In this talk, several tone mapping techniques will be discussed, static, such as LUTs, and dynamic, based on metadata, in addition to analyzing the advantages of each.



Esdras Miranda, Director of Technology and Operations at the Jangadeiro Communication System

Postgraduate in Business Management from Fundação Getúlio Vargas, Graduated in Electrical Engineering – Electronic Modality from the University of Pernambuco. He worked as a teacher on the Telecommunications Engineering Course at Faculdade Maurício de Nassau (Campus Recife). He currently holds the position of Director of Technology and Operations at Jangadeiro, a Communication Group formed by two TV Generators affiliated with SBT (located in Ceará), Rádio Jangadeiro Band News FM and Rede Jangadeiro de Rádio, composed of 8 FM stations in the state. He is a member of the Brazilian Society of Television Engineering (SET).



Karlos Rabello, Sales Manager for Latin America and the Caribbean, disguise

Karlos Rabello is at the forefront of Disguise's strategy for Latin America and the Caribbean, providing Virtual Production solutions, extended and augmented reality, graphics and storytelling solutions in projects at the main television stations and film producers in the region. With more than 20 years of experience in the media and entertainment market, with experience at Adobe, Vitec, SanDisk and CadriTech leading the 3D/2D Animation business unit with Autodesk M&E, Toonboom and Adobe. At disguise, our mission is to provide a safe and innovative platform for technicians and creatives to deliver innovative experiences to their audiences.



José Filipe Ferraz Valente, Video Standardization Engineer - Philips

José Filipe Ferraz Valente has a Bachelor's degree in Electronic Engineering. He has worked in the Broadcast area for over thirty years in different roles. He currently works as a Video Standardization Engineer for Philips and as such, is involved in the new TV2.5 and TV3.0 standards in Brazil through the SBTVD forum. Previously, on Globo | Globosat worked on the implementation and projects of TV systems and participated in the preparation and execution of major events such as the Olympics, World Cups and musical shows, such as Rock in Rio. During this period, Filipe also worked as coordinator in the event production area live. Furthermore, he worked at Seal B&C – Convergint, a broadcast and content systems integrator company, as a Systems Engineer and at Oi, a Telecom company, as a Specialist Consultant in the video area.

FAST: IS GRAVITY SOLELY IN THE AUDIENCE, OR WILL THIS FORCE BE ENOUGH TO ACCELERATE THE ORBIT OF THE ENTIRE VALUE CHAIN?

In the past year, the FAST Channel has become one of the hottest topics at all events, conferences, and a permanent agenda item in discussions about content distribution and monetization within communication groups and the entire value chain of the Media and Entertainment industry.

The focus of this panel will be to discuss the movement in more mature markets in terms of audience growth and profile, positive revenue projections, the entry of premium content, and a concrete vision of the Brazilian market, its challenges, and potential.

Moderator: Daniela Souza, Advisor to SET and SVP AD Digital

Speakers:

- **Aline Jabour**, LATAM Business Development Director, Samsung TV Plus
- **Roberto Grossman**, Director of Digital Transformation, SBT
- **Ingrid Veronesi**, Senior Director, Comscore Brasil



Daniela Souza, SET Advisor and SVP AD Digital

Daniela Souza is the founder of the company AD Digital, where she currently serves as SVP, SET Advisor and Co-curator of the SET Experience. He entered the Media and Entertainment market in 1994. He is a guest speaker at the main events related to the creation, management and distribution of content, in which he shares his vision of the market and future trends for the industry. He has been participating in major projects at Grupo Globo, YoutubeSpace, Grupo Jovem Pan, CNNBrasil, Afya, Google, among many other communication groups, both national and regional. She also participates in WIN (WIN is a space for women for everyone, where experiences and challenges are exchanged on topics related to innovation.)



Aline Jabbour, LATAM Business Development Director, Samsung TV Plus

Aline leads the content acquisition strategy in Latin America for Samsung TV Plus, a free streaming service owned and operated by Samsung, available in 23 countries and more than 100 million TV devices around the globe. Aline has more than 20 years of professional experience working in the areas of Products, Marketing and Content Negotiation in multinational and national companies, such as SKY and Claro.



Roberto Grosman, Director of Digital Transformation, SBT

Roberto Grosman is a long-time executive in the technology and marketing market, with more than 20 years of experience in companies such as the agency F.biz (where he served as CEO for eight years), Google, Amazon and the edtech Descomplica, in addition to having been co-founder of Fulano, one of the first start-ups in Brazil. He currently serves as Chief Transformation Officer at SBT, with the mission of leading the company's innovation strategies, uniting the essence of Open TV with the needs and advances in new business models with a digital bias. Grosman has a degree in administration from FGV and an MBA from the MIT Sloan School of Management in Cambridge, in the United States.



Ingrid Veronesi, Senior Director, Comscore Brasil

With more than 20 years of experience in the digital market, Ingrid has worked in various segments, from publishers such as Grupo Clarín, Editora Globo, iG and UOL to digital agencies such as Pop Com and Tribal, and technology platforms such as Predicta and YBrant. She started at Comscore Brasil in 2015 as a sales manager, took over in 2021 as senior director, and has been working with a focus on sales and new business. She was elected by Amigos do Mercado as one of the Top 100 leaders in the Brazilian communications market.

REINVENTING IN THE DIGITAL ERA: STRATEGIES TO SURVIVE AND THRIVE IN A TRANSFORMING MARKET

Moderator: Flavio Menna Barreto, Director of Operations at Warner Bros Discovery Brazil

Speakers:

- **AFTER ALL, WHAT DO WE SELL? ADVERTISING IN TIMES OF MULTI-DISTRIBUTION AND COUNTLESS PLAYERS**

Speaker: Acácio Luiz Costa, Executive Secretary of the CNN Brasil Council

Market has changed. Do you need to change to survive?

What must be changed? What must be preserved?

Everything is being questioned.

How should we position our contents in the advertising market?

The pandemic aggravated the slowdown in business already caused by the digital media revolution – and the consequent change in the profile of professionals and demands from Agencies and Advertisers.

All of this, in the midst of an Industry in Crisis – roles of Agencies, Vehicles, Advertisers, Consultancies in the midst of economic recession.

The fundamentals and paradigms of Marketing and Publicity, previously set in stone, are questioned or forgotten today – what can be saved?

How Radio and Television broadcasters should support each other and react in the dispute for audience attention and advertiser investments. How to stop and survive the dispute for the attention of the audience and advertiser?

- **NEW OTT REVENUE STREAMS: TRANSFORMING SVOD INTO A SUCCESSFUL SVOD + AVOD EXPERIENCE**

Speaker: Mathias Guille, VP Cloud Platform, Broadpeak

In this talk, we will explore the transformative power of incorporating advertising-based video-on-demand (AVOD) into subscription video-on-demand (SVOD) services. By

combining these two models, content providers can tap into additional revenue streams while enhancing user experiences. We will delve into the benefits, challenges, and strategies involved in making this transition.

Maintaining an optimal balance between ad frequency, placement, and user experience is essential for a successful SVOD + AVOD service. We will navigate the delicate balance between ads and user experience, discussing strategies to ensure a seamless and enjoyable viewing experience for subscribers without compromising on ad revenue.

Finally, to provide practical insights, we will examine real-world examples of successful SVOD + AVOD implementations. By studying concrete case studies like Netflix and Disney+, we can extract best practices and lessons learned, enabling the audience to gain valuable knowledge for their endeavors.

- **HOW TO EFFECTIVELY MAP YOUR LISTENERS' CONSUMPTION HABITS AND MAKE A LOT OF MONEY IN THE FIRST MONTH.**

Speaker: Thiago Fernandes, CEO of Nextdial and Director of Digital Audio at Abott's
With the growth of technology, data collection is becoming easier and more affordable for broadcasters. This data can be used to identify listeners' consumption patterns and create highly effective advertising strategies.

During the talk, you will learn about market trends that are shaping the way broadcasters collect and use consumer data, as well as the tools and techniques available to map your listeners' consumption habits. You'll also learn how to use this information to create personalized content and highly effective advertising strategies that generate significant results in the short term.

- **THE POWER OF THE WBD ECOSYSTEM IN AN INCREASINGLY FRAGMENTED WORLD**

Speaker: Eduardo Coutinho, Director of Commercial Planning, Warner Bros Discovery

Consumers today are the ones who decide where and when they will consume content and how they will engage with brands.

Based on this maxim, how is WBD looking at this market transformation and has been shaping the new needs of consumers and brands? What is the role of entertainment in the consumer's life? And how can brands amplify their conversations through entertainment?

During this chat, we will learn about the paths and actions that WBD has been working on to be efficient in delivering business solutions to its partners.



Flavio Menna Barreto, Director of Operations at Warner Bros Discovery Brazil

Based in SP, he joined the company in 2016, leading activities related to Technology and Operations for the production, distribution and monetization of content on linear channels and digital platforms, as well as Commercial Operations activities. He is currently responsible for operating live events and programs such as Champions League and Brasileirão matches and broadcasts of awards shows such as the Oscars, Emmys and Grammys. Previous experiences include 18 years as an Executive at TV Globo, responsible for leading digital transformation projects for corporate management, and IT support for multiplatform content production and distribution processes in areas such as entertainment, journalism, sports and programming. He also served as Director of New Business at Radix Engenharia and Consultant at Accenture. He has a degree in Mechanical Engineering from the Federal University of Rio de Janeiro, Systems Analysis from PUC-RJ, an MBA from IBMEC-RJ in Business Management and in Electromechanical Systems Engineering Technology from Montgomery College in Maryland, USA.



Acácio Luiz Costa, Executive Secretary of the CNN Brasil Council

Multidisciplinary Communication Executive with extensive experience (+ 35 years of experience) in Management, Marketing, Planning, Commercialization and in formulating positioning strategies – on and offline. He led radio stations with the most varied programming formats and on national, regional, segmented and PayTV stations. Advertising and broadcaster has an associational career on the Board of Abert, AESP, CONAR and CENP. Passages for Grupo Bandeirantes de Rádio e Televisão, Rede Massa, Sistema Globo de Rádio, Rede Transamérica, Estadão, Grupo Mix among others.



Mathias Guille, VP Cloud Platform, Broadpeak

Mathias Guille is the Vice President of "Cloud Platform" at Broadpeak. He leads the strategic development of Broadpeak's cloud platform, including building the company's infrastructure in the cloud and public data centers, designing the Broadpeak platform and the company's applications to accommodate SaaS offerings. With over 10 years of experience in telecommunications and video streaming, and a solid technical background, Mathias has developed a deep understanding of the TV market, which allows him to identify industry trends and offer Broadpeak's service provider clients innovative ideas for create custom platforms. Mathias Guille has a master's degree in engineering from IMT Noth Europe, in France.



Speaker: Thiago Fernandes, CEO of Nextdial and Director of Digital Audio at Abbott's

Thiago Fernandes, founder of Nextdial (@nextdialbr), a technology startup that is simplifying the lives of radio professionals, agencies and advertisers. He was an Evangelist at Microsoft and has a degree in Computer Science, an MBA in Software Engineering from ITA and a specialization in Marketing from ESPM.



Eduardo Coutinho, Director of Commercial Planning, Warner Bros Discovery

With solid experience in agencies and vehicles, such as Publicis, BorghiErhLowe (currently MullenLowe) and Sony Entertainment, he developed a work philosophy focused on people and results, creating constructive human relationships, inspiring and developing not only his employees but also commercial partners. He is currently Director of Commercial Planning (digital, linear and other BUs) at Warner Bros. Discovery where he leads a diverse team that builds plans based on disruptive, innovative and multichannel strategies with the aim of attracting, retaining and selling more in a systemic way.

REMOTE PRODUCTION: USE CASES

Remote content production has experienced significant advancements in recent years, driven particularly by the pandemic period. This technology has allowed companies to reduce the need for large teams to be physically present at events, resulting in an increase in the number of productions carried out and a reduction in operational costs. In light of this context, the panel aims to showcase a variety of use cases for this technology in different types of events, while analyzing the key challenges and benefits associated with each one.

Moderator: Cauê Franzon, Executive Manager of TV and Radio Technology, RBSTV

Speakers:

- **THE NEW REMOTE PRODUCTION TOOLS FOR LIVE EVENTS WITH BROADCAST QUALITY**

Speaker: Fábio Eitelberg, Executive Director, 2Live Streaming

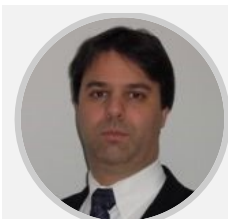
- **CLOUD PRODUCTION - TRANSMISSION TO CBCS GAME SPORTV**

Speaker: Igor Moraes, Founder, Executive Director of vem TV (Video Engineering Management)

- **REMOTE PRODUCTION FOR EVENTS, PROGRAMS AND TELEVISION NEWSPAPERS**

Speaker: Frederico Pereira, Head of Capture and Production Platform, Globo

In a journey of constant transformation of its technology operations, Globo has been implementing new production models in recent years, as a result of the new opportunities offered by technological evolution and the rethinking of formats, provided by the discussions of its multidisciplinary teams. The lecture in question aims to present experiences in remote production, its benefits and associated challenges.



Cauê Franzon, Executive Manager of TV and Radio Technology, RBSTV

Graduated in Engineering, Master in Production Engineering, Federal University of Rio Grande do Sul, with an MBA in Project Management, FGV. He began his career in TV in 1996. He worked for more than 10 years as a technician and support engineer for audio and video systems, coordinated a research group for television products and solutions for 3 years, worked as infrastructure and infrastructure project manager TV and

Radio and currently manages the technology area at RBSTV. He was the leader of several projects such as the remodeling of Rádio Gaúcha, implementation of virtual scenography, modernization and restructuring of productions and exhibitions at the group's stations in the interior of the state, implementation of IP infrastructure (2110) at the Porto Alegre station, among others.



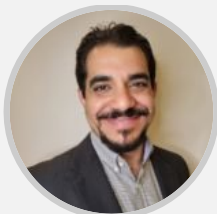
Fábio Eitelberg, Executive Director, 2Live Streaming

Fábio Eitelberg. Journalist (Faculdade Cásper Líbero) and advertiser (ESPM), he is executive director of 2Live Streaming. He pioneered technologies for encoder and live video transmission, serving the main radio and TV stations and news agencies in the country. Founder and partner of Ablink, a production company specializing in live streaming with extensive operations in the corporate and sports markets. As a journalist, he worked for more than fifteen years in television, working for SBT, TV Cultura and Record. He was a special reporter, editor and presenter. He won the international Biodiversity of the Atlantic Forest award, the ABERJE award and was a finalist for the Esso Journalism Award. He is the founder of Coletivo Reviralata, focused on producing short documentaries.



Igor Moraes, Founder, Executive Director of vem TV (Video Engineering Management)

Broadcast Engineer, Design and Operation of TV and Streaming Systems. Team and project manager for Sports, eSport, Entertainment content. At De Nadai Comunicação, I was Founder, Partner and Director of Operations, with a disruptive Remote Production project. At Grupo Globo, I spent 33 years in Technology from intern to becoming Manager of the Outdoor Sports Technology Team in São Paulo. He is an engineer from FESP - Faculdade de Engenharia São Paulo and has an MBA in Economics and Business Management from Fundação Getulio Vargas.



Frederico Pereira, Head of Capture and Production Platform, Globo

Electrical Engineer, MBA in Projects and People Management. With 20 years in the media technology market, he has experience in the areas of operations, distribution, projects, support, IT infrastructure and telecom, having participated in important milestones in the transformation of the industry during this period. He is currently responsible for the Capture and Production Platform of the Content Operations and Distribution Hub, in Globo's Strategy and Technology area.



Eduardo Coutinho, Director of Commercial Planning, Warner Bros Discovery

With solid experience in agencies and vehicles, such as Publicis, BorghiErhLowe (currently MullenLowe) and Sony Entertainment, he developed a work philosophy focused on people and results, creating constructive human relationships, inspiring and developing not only his employees but also commercial partners. He is currently Director of Commercial Planning (digital, linear and other BUs) at Warner Bros. Discovery where he leads a diverse team that builds plans based on disruptive, innovative and multichannel strategies with the aim of attracting, retaining and selling more in a systemic way.

SUCCESSFUL LOCAL MODELS IN REGIONAL MEDIA COMPANIES: INSPIRING STRATEGIES

The media industry is one of the most rapidly transforming industries today. The quest for innovation is constant, and keeping up with these transformations presents a significant challenge, but also a universe of opportunities.

How are regional media companies reinventing themselves and creating differentiated solutions for their clients, businesses, and markets? Three companies from different regions of the country will share relevant success stories in their respective areas of expertise.

Moderator: Patricia Rego, Director of Planning and Contracts - Globo

Speakers:

- **Vinicius Garrido**, CEO at TV TEM
- **Rodrigo Liborio**, Commercial Director Curitiba and National Market in the PRC - Rede Paranaense de Comunicação
- **Phelippe Daou Junior**, CEO at Rede Amazônica Group



Patricia Rego, Director of Planning and Contracts - Globo

Graduated in Engineering at PUC Rio, with Executive MBAs at IAG Master at PUC RJ, IBMEC RJ and FDC Minas, in addition to a POST MBA at Kellogg Executive Education, she is currently director of Planning and Contracts in the Affiliates area at Globo, responsible for negotiations between Globo and its Affiliates, for the formation and monitoring of business models and the implementation of multidisciplinary projects, contributing with inputs for the management and distribution strategy of the Network. He worked in several areas at Globo, including Globo de NY, benchmarking American business models and was responsible for implementing an indoor theme park. She is trained as an administration counselor by IBGC and GONew.



Vinicius Garrido, CEO at TV TEM

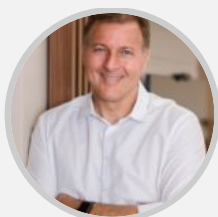
Vinicius Garrido is CEO of TV TEM, an affiliate of Rede Globo in the interior of São Paulo. Graduated in Systems Engineering, Accounting and Economics, with a postgraduate degree in Marketing, People Management and Business Management, he joined the broadcaster in 1997 as an intern and has since held various roles, including:

technology supervisor, administrative manager, financial director and institutional, assuming the position of CEO in 2021.



Rodrigo Liborio, Commercial Director Curitiba and National Market in the PRC - Rede Paranaense de Comunicação

Commercial Director of RPC affiliated with Rede Globo and belonging to GRPCOM (Grupo Paranaense de Comunicação). Rodrigo has more than 20 years of experience in the commercial area, Advertising and Marketing and 16 years in business management; He has a degree in Administration and a postgraduate degree in Strategic and Economic Business Management.



Phelippe Daou Junior, CEO at Grupo Rede Amazônica

Son of communications businessman Journalist Phelippe Daou and Mrs. Magdalena Arce Daou. He graduated in Electronic Engineering from Escola de Engenharia Mauá in São Paulo, with an emphasis on Telecommunications. He also graduated from the Information Technology Strategic Management Program at the São Paulo School of Business Administration, Fundação Getúlio Vargas, and completed an MBA in Financial Management and Corporate Strategies at the same institution. Phelippe Daou Júnior effectively contributed to the implementation of the expansion of radio and television stations belonging to the Rede Amazônica Group, especially in the activation of TV Cruzeiro do Sul (AC), Rádio Amapá FM (AP), Brasília Branch (DF) and Amazon Sat in 1992, he effectively participated in the technical and administrative restructuring of TV Acre in 1995, the same occurring with TV Roraima in 1996. Today he dedicates his time effectively as CEO of Grupo Rede Amazônica, the largest communications company in the Amazon, whose value proposition is to defend the Amazon and the Amazonians, a commitment defended and bequeathed by his father, Journalist Phelippe Daou.

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REGULATORY UPDATES

This meeting with the leaders of the Ministry of Communications and Anatel will address the most important things that happened in the regulatory sphere in the last year and what we should expect in the coming years..

Moderator: Francisco Peres, Coordinator of the SET Infrastructure Sharing GT

Speakers:

- **Geraldo Cardoso de Melo**, SET Regulatory Consultant
- **Vinícius Caram**, Superintendent of Grants and Payment Resources - Anatel
- **Wilson Diniz Wellisch**, Secretary of the Electronic Social Communication Secretariat of the Ministry of Communications



Francisco Peres, Coordinator of the SET Infrastructure Sharing GT

Graduated in Telecommunications Engineering from Universidade Federal Fluminense, Master's degree in Applied Electromagnetism from PUC-Rio and MBA from FGV. He is currently Manager of the Projects and Licensing area of Globo's Telecommunications systems.



Geraldo Cardoso de Melo, SET Regulatory Consultant

Geraldo Cardoso de Melo is a Telecommunications engineer with a degree and specialization from the Pontifical Catholic University of Minas Gerais (PUC-Minas). Consulting engineer in broadcasting services, Professor at PUC-Minas, member of the SET Spectrum Working Group and coordinator of SET Sudeste.



Vinícius Caram, Superintendent of Grants and Payment Resources - Anatel

Superintendent of Grants and Resources for Provision at Anatel. Master in Telecommunications Engineering and postgraduate degree in Telecommunications Management from the University of Brasília (UnB). Specialist in Governance and Regulatory Control from the National School of Public Administration (ENAP). Telecommunications Network Consultant between 1998 and 2011. Professor of Electrical Engineering courses at private universities in Brasília. Servant at the Agency since 2011, having worked in the regulatory area, in the area of Critical Infrastructure Management and Quality Obligations Control manager.



Wilson Diniz Wellisch, Secretary of the Electronic Social Communication Secretariat of the Ministry of Communications

Graduated and master in Electrical Engineering from the University of Brasília (UnB). He has been a career employee of the National Telecommunications Agency (Anatel) since 2011, where he worked in the Superintendence of Private Services, was an advisor to the Management of Control of Obligations for Universalization and Expansion of Access, Superintendent of Grants and Substitute Provision Resources, Superintendent of Inspection and Substitute President. Seconded to the Ministry of Science, Technology, Innovations and Communications in 2019, he served as Director of the Department of Digital Inclusion, Deputy Secretary of Telecommunications and Secretary of Broadcasting. He was Director of the Telecommunications and Broadband Infrastructure Projects Department of the Ministry of Communications until March 2021.

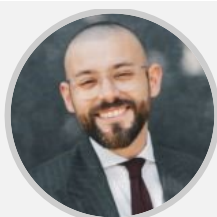
THE ROLE OF METADATA IN OPTIMIZING PRODUCTION WORKFLOWS AND ENRICHING ASSETS IN THE ARCHIVE

In this panel, we will address the importance of metadata in optimizing content production and enriching the content archives of content creators with the aim of increasing the monetization potential of older assets. Within this context, we will also explore the intersection of metadata and artificial intelligence, along with advancements in search technologies that facilitate media discovery. We will have perspectives from Brazilian media companies as well as from Avid, who will share research findings regarding the transformation of asset management driven by new metadata organization strategies and the integration of AI tools.

Moderator: Matt Silva, CEO do CIS Group Corp

Speakers:

- **Fábio Ferraz**, Director of Media Solutions, Globo
- **Shailendra Mathur**, Vice President and Chief Architect, Avid Technology
- **William Rogério de Oliveira**, Technology and Digital Products Manager at Fundação Cásper Líbero
- **Fernando Castelani**, Cloud Consulting Account lead, Google Cloud



Matt Silva, CEO do CIS Group Corp

Matt Silva has a degree in Business, Finance and Economics from the Stern School of Business – New York University. He worked as an investment analyst at financial institutions such as Citl and Credit Suisse in N.Y. At CIS Group he served as Director of Corporate Development, COO and is currently CEO of the company.



Fábio Ferraz, Director of Media Solutions, Globo

Specialist in Project Management, Business and IT from FGV-RJ (Post-MBA and MBA) and in Software Project Management from PUC-RJ, Fabio Viviani Ferraz completed 22 years working as a Technology Business Executive in the Media Industry (Television and Radio), having been in charge of managing Globo's portfolio of Media Solutions Technology Projects in recent years, focused on the Content Value Chain (Capture, Production, Post-Production, Media Preparation, Exhibition and Distribution).



Shailendra Mathur, Vice President and Chief Architect, Avid Technology

In his role as Vice President and Chief Architect, Shailendra Mathur is responsible for the technology strategies and architecture of Avid's products. Shailendra has been awarded several patents and presented papers at numerous conferences, panels and magazines on topics such as AI, asset management, 4K/HDR, high performance computing, cloud technologies, security, immersive entertainment, computer vision and medical imaging. With over 25 years of experience in innovation in the media industry, Shailendra was privileged to be one of the team members who received the Prime Time Philo T. Farnsworth Engineering Emmy Award on behalf of Avid in 2018.



William Rogério de Oliveira, Technology and Digital Products Manager at Fundação Cásper Líbero

William is a professional with over 20 years of experience in IT and Broadcast, specializing in service management and solution architecture. Graduated in Network Technology and has a Postgraduate Degree in Architecture and IT Infrastructure Management from FIAP, in addition to an Executive MBA from Insper. William currently holds the position of Technology and Digital Products Manager at Fundação Cásper Líbero, a non-profit institution that encompasses several companies, including TV Gazeta, Radio Gazeta FM, the Gazeta Esportiva portal and Faculdade Cásper Líbero. With solid expertise in mission-critical environments and leadership of multidisciplinary teams in the areas of Technology, Broadcast and Digital Products, William has a successful track record in developing complex projects for companies in the media and entertainment, education, internet and pharmaceutical industries. . Currently, he leads the Foundation's technology and digital products areas, responsible for creating and implementing solutions for the production and distribution of multiplatform content, connectivity, in addition to the development of new products aimed at the Media and Education sectors.



Fernando Castelani, Cloud Consulting Account lead, Google Cloud

With more than 20 years of experience in the Media industry, working on large-scale digitalization and digital transformation projects, he worked for companies such as Harris (Imagine), developing modernization projects for several media groups in Brazil. He later led technology teams at the Disney Group, and is currently developing activities on Google Cloud related to the adoption of the Cloud as a transformational tool for traditional Media Supply Chain flows, with a focus on improving efficiency, scalability, culture and innovation.

TV 3.0: STAY TUNED FOR THE TECHNOLOGICAL REVOLUTION THAT IS COMING

The development of TV 3.0 is entering its final stretch. The SBTVD Forum, with the support of the Ministry of Communications, RNP, and a group of 90 researchers from 7 universities, is conducting tests and research, developing specifications, and creating demonstrations. Some partial demonstrations are already available at the SET Expo 2023. An end-to-end demonstration of the new system is planned for the SET Expo 2024. Decree No. 11,484/2023 establishes a deadline until the end of 2024 for the completion of the studies by the SBTVD Forum, the Ministry of Communications, and Anatel. The operation of TV 3.0 is expected to begin in 2025. Come and learn more about the technological advancements of TV 3.0 that will revolutionize television in Brazil.

Moderator: Luiz Fausto de Souza Brito, Coordinator – Technical Module, SBTVD Forum

- **Cristiano Akamine**, Researcher at the Digital TV Laboratory at Universidade Presbiteriana Mackenzie
- **Carlos Cosme**, Innovation specialist in the Telecom group of the Infrastructure and Security Hub, Globo
- **Marcelo F. Moreno**, Associate Professor, Federal University of Juiz de Fora (UFJF)



Luiz Fausto de Souza Brito, Coordinator – Technical Module, SBTVD Forum

He has a Professional Master's Degree in Applied Computing from UECE (2015), an Executive MBA in Information Technology from UFRJ (2011), an extension course in Networks and Video over IP from UFRJ (2009) and a degree in Electrical Engineering with an emphasis on Electronics from UFRJ/ USU (2005). He is currently a Technology and Regulatory Specialist at Globo, coordinator of the Technical Module of the SBTVD Forum, coordinator of SWG 6B-2 (Multimedia) of ITU-R WP 6B (Broadcast service assembly and access), member of the Brazilian Delegation at ITU-R (SG 6 – Broadcasting Service) and at CITEC (CCP.II – Radiocommunications).



Cristiano Akamine, Researcher at the Digital TV Laboratory at Universidade Presbiteriana Mackenzie

He holds a degree in Electrical Engineering from Universidade Presbiteriana Mackenzie (1999), a master's degree and doctorate in Electrical Engineering from the State University of Campinas (2004/2011). He has been a researcher at the Digital TV Laboratory at Universidade Presbiteriana Mackenzie since 1998, completed an internship at the NHK Science and Technology Research Laboratories (STRL) and was

a Visiting Specialist Professor at the Faculty of Technology at Unicamp. He is currently a professor in the Electrical Engineering course and the Postgraduate Program in Electrical and Computer Engineering (PPGEEC) at Universidade Presbiteriana Mackenzie and coordinator of the Digital TV Laboratory at Universidade Presbiteriana Mackenzie. He is a member of the deliberative council of the Brazilian Terrestrial Digital TV System Forum (SBTVD), Brazilian Society of Television Engineering (SET) and Associate Editor of IEEE Transactions on Broadcasting. He has several patents and several published articles and has experience in the area of Electrical Engineering, with an emphasis on digital TV, digital communication, channel coding, embedded systems, reconfigurable logic and software-defined radio.



Carlos Cosme, Innovation Specialist in the Telecom group of the Infrastructure and Security Hub, Globo

Carlos Eduardo Cosme Ribeiro has a degree in Electrical Engineering from Universidade Estácio de Sá (2007), a postgraduate degree in Control and Automation Engineering from Universidade Gama Filho (2011) and a specialist in Computer Networks from PUC Rio (2013). He has worked at Globo since 1998, where he worked in the operations and support areas. He is currently an innovation specialist in the Telecom group of the Infrastructure and Security Hub. He is a member of the Brazilian Terrestrial Digital TV System Forum (SBTVD), where he coordinates the Audio Coding, Video Coding and Subtitles working groups in the TV 3.0 Project.



Marcelo F. Moreno, Associate Professor, Federal University of Juiz de Fora (UFJF)

Visiting Researcher at the International Audio Laboratories Erlangen, the Institute for Integrated Circuits of the Fraunhofer Society (Fraunhofer IIS) and the Friedrich-Alexander-Universität (FAU), Germany. He has been an associate professor at the Department of Computer Science at the Federal University of Juiz de Fora (UFJF) since 2011. He holds a master's degree (2002) and a doctorate (2008) in Information Technology from PUC-Rio. He has worked on national and international research, technology transfer and standardization projects in Digital TV, IPTV and multimedia since 2004. Since 2013, he has been leader of Question 13/16 "Multimedia application platforms and end systems for IPTV" of the International Union of Telecommunications (ITU-T), where he also co-leads the groups WP1/16 "Infrastructure for Multimedia Systems" and TG – Media Coding, in "Immersive Media Coding for metaverse applications and services" (in the Focus Group in the ITU-T metaverse). Since 2015, he has been coordinator of the Middleware GT of the SBTVD Forum, leading efforts to standardize DTVPlay, the development of its test suite and its evolution towards TV 3.0. He is a productivity fellow in technological development from CNPq (DT-2).

MOBILITY AND INTERACTIVITY: THE FUTURE OF ENTERTAINMENT

In a scenario where the dynamics of the media and entertainment market have been changing at the speed of the emergence of a new thread, the expansion of connectivity and its new generations (5G and 6G) bring diverse possibilities for applications, especially in the mobile segment. With an increasingly (hyper)connected public and an appetite for consuming entertainment anywhere and at any time, what is the real role of 5G in the future of mobile entertainment, given the advancement of augmented reality, virtual reality and 3D games? What is the role of Edge Cloud in this transformation? How will the applications (and consumption) of these new technologies enable the new generation of tactile internet – 6G? What to expect from this (near) future and its effervescent possibilities for applications for mobile entertainment? What about components and devices?

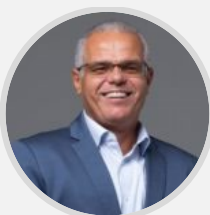
Moderator: Brother Pinto, Director - Informa Markets

- **Marcio Aguiar**, Director of Enterprise in Latin America, NVIDIA
- **Wilson Cardoso**, CTO Latin America, Nokia
- **Leonardo Chaves**, Innovation Lab Manager | Telecom | Globe
- **Guilherme Saraiva**, Commercial Director, Embratel
- **Vinicius Vasconcellos**, Senior Consultant CoC TME, IBM Consulting



Hermano Pinto, Director - Informa Markets

Hermano Pinto is an electrical engineer, graduated from Escola Politécnica da USP (EPUSP) and bachelor's degree in Economics from FEA-USP, with a professional master's degree in business management from Duke University, in North Carolina (USA). He carried out professional activities for 30 years in Siemens Group companies, in the areas of telecommunications and technology, where he held various positions in Brazil, Latin America and Europe. He was Worldwide President of Siemens AG's Wireless Access Business Unit in Munich. Advisor to several trade associations, in addition to holding the position of Director of the Telecommunications Division of the Infrastructure Department (DEINFRA) at FIESP. He is currently General Director of the Infra&Tech Center (Infrastructure & Technology) for Brazil at the British group Informa.



Marcio Aguiar, Director of Enterprise in Latin America, NVIDIA

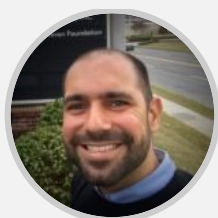
Marcio Aguiar is the Director responsible for the Enterprise division in Latin America, focusing on the development of Artificial Intelligence technologies and the expansion of the use of NVIDIA software and hardware platforms for virtualization, professional visualization, Data Center and HPC in the region, offered by partners of the company's channel program - NVIDIA Partner Network, which include resellers, OEMs, integrators

and distributors. With over 25 years of experience in IT sales, Marcio has worked at the company for over 12 years and has a deep understanding of NVIDIA platforms, being valued for his leadership style, ability to effectively balance strategy and execution, and for his success in building lasting relationships with customers. Marcio graduated in Business Administration from Loyola Marymount University, in Los Angeles, California.



Wilson Cardoso, CTO Latin America, Nokia

Wilson Cardoso is vice-president of the 5G Brazil Project and Director of the Telecommunications Infrastructure Department at FIESP and Director of the telecommunications sector group at ABINEE. He received his doctorate in electrical engineering from the Massachusetts Institute of Technology (MIT) in 1997. He has 37 years of experience in telecommunications having developed activities in R&D, solutions and technical support in Brazil, USA, Colombia, Germany and Singapore, in addition to two patents international IP transmission over satellite. Today he works as Nokia's CTO for Latin America and Brazil.



Leonardo Chaves, Innovation Lab Manager | Telecom | Globe

Leonardo recently took over a new area. He is the current Manager of the Innovation Lab with a focus on Telecom, an area that proposes and implements actions that explore new technologies applied to the context of networks for content production, the next generation of TV, and new media consumption experiences. He is passionate about the innovation process and seeks to accelerate the adoption of disruptive solutions through the external ecosystem, relying on startups, innovation hubs and centers of excellence. He graduated from the Federal University of Rio de Janeiro, where he also completed his master's degree in Engineering in 2013. He has an MBA in business management from PUC-Rio and between 2017 and 2020 he was the coordinator of the Technical Module of the Brazilian Digital TV Forum.



Guilherme Saraiva, Commercial Director, Embratel

Guilherme is Commercial Director for the Media and Satellite Segments at Embratel, where he supports clients in developing their businesses in the physical and digital worlds. Telecommunications engineer from IME, with an MBA in marketing from FGV, Master in Finance from FGV and MBA in Data Science from PUC-RJ.



Vinicius Vasconcellos, Senior Consultant CoC TME, IBM Consulting

Vinicius is a senior consultant at IBM, focusing on the application of new technologies such as Artificial Intelligence, Blockchain, Cloud, Big Data and Analytics in the Telecom, Media and Entertainment industry. With solid experience in telecom and broadcast, he worked as a specialist and executive at Claro and Grupo RBS. He has a degree in Electrical Engineering with a Specialization in Administration from UFRGS and an MBA in Executive Management from Fundação Dom Cabral.

RELATIONSHIP BETWEEN AUDIENCE DATA AND PERFORMANCE

What are the possibilities for exploring personalized content based on metrics currently? How to evaluate methodologies used in the linear media distribution environment compared to metrics in the digital platforms and Connected TVs environment? What are the prospects with the Hybrid TV project (TV 3.0)?

The panel aims to hear about achievements and challenges for the future from some companies operating in this sector.

Moderator: Carlos Fini, President from SET

- **TV 3.0 IN PRACTICE: CHALLENGES FOR THE BUSINESS AREA**
Speaker: Bruno Pacheco, CEO of Zedia

The future of TV lies in the internet, personalization, and intensive use of data. Supported by the rapid growth of Smart TVs and the strong demand from advertisers for digital audiences, the media market is slowly moving, trying to adapt to a user who never stops running.

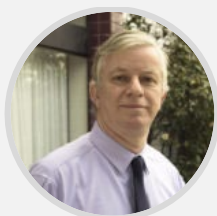
We have built the first media platform to operate targeted content and ads on Free-to-Air TV. We have been doing this since 2021 and have built great success stories, but getting here was not easy. We came to this year's SET EXPO to tell a bitter truth: no TV station is prepared for TV 3.0.

Beyond technical, regulatory, and investment obstacles, the real challenge for TV lies in its operation and business model. For over 70 years, our TV has been all about "linearity."

Marketing, product, sales, and operations departments all in sync with programming that starts and ends at the same time. Order, OPEC, Insertion, Basket. Fundamental concepts in every station that lose their original meaning when each user watches personalized content whenever they want.

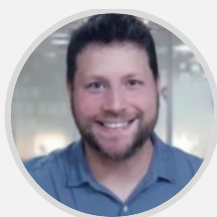
The opportunities are countless: growth, revenue, and value generation for the entire market. But for TV to maintain its influence and revenue, it needs to bring the digital world to the core of its business. The TV of the future is being designed today, and we will present practical actions on how each TV station can (and needs to) start this transformation from within, today.

- **Raphael Barbieri**, CTO da EiTv
- **Marco Antonio Melo**, CEO and Commercial Director, SHOWCASE



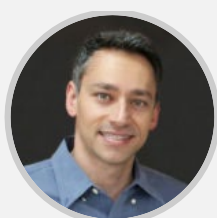
Carlos Fini, President of SET

Carlos Fini is President of the Brazilian Society of Television Engineering (SET), for the 2019-2020 biennium, Technology Director of the RBS Group, one of the largest media groups in Brazil, where he manages TV and Radio operations and Director from the Gaúcha Association of Radio and Television Broadcasters (AGERT), serving on the technical committee. He is an electronics engineer, with a specialization in Business Management and a postgraduate degree in Telecommunications and Networks. He worked at TV Globo from 1979 to 2012, taking on the role of Engineering Manager in São Paulo in 1994. Among his works are the implementation of stations in São Jose dos Campos in 1988 (TV Vanguarda), in São Paulo in 1999 (TV Globo SP) and the digital transmission system in the same city in 2007. He has been a member of SET since 1988 and a participant in the Technical Module of the Brazilian Digital TV Forum (SBTVD Forum), in which he was coordinator of multiplexing and middleware standards from 2006 to 2012.



Bruno Pacheco, CEO of Zedia

Founder and CEO of Zedia, Bruno Pacheco helps large networks and media groups in Brazil to transform their businesses. Built as an operating system for the TV of the future, Zedia uses data and intelligence to solve one of TV's biggest pain points: delivering a personalized content and advertising experience, centered on the audience's characteristics and tastes. Bruno is passionate about stories and technology. For over 15 years, it has been developing products and solutions for the media, entertainment and advertising market.



Raphael Barbieri, CTO da EiTv

MBA, Project Management from FGV, Computer Engineer, from UNICAMP. Since 2007, he has worked at EiTv studying and implementing new hardware and software solutions for streaming and digital television technologies. Responsible for structuring teams, monitoring deadlines, standards, quality and delivering on-premise or cloud-based software. Coordinator of the GT-ST of the Brazilian Digital Television Forum. Skilled in Product Management, broadcast equipment, IPTV systems and OTT solutions for a variety of technologies (ISDB-Tb, DVB, IP, Satellite, Digital TV, Embedded Systems, Linux servers), set-top box development, middleware for digital TV manufacturers.



Marco Antonio Melo, CEO and Commercial Director, SHOWCASE

Graduated in Business Administration from PUC-SP. 17 years of experience in the Digital TV market. 42 years of experience in the IT market.

POTENTIAL MONETIZATION OPPORTUNITIES FOR TV 3.0

Moderator: Sergio Eduardo Di Santoro Bruzetti, Engineering Planning Advisor - RecordTV

- **Luis Camargo**, Media & Entertainment Business Developer Lead – Google Brazil | Pres. IAB Brazil Digital Video Committee | SET Advisor
- **Paula Carvalho**, Commercial Director of Media Owners, Kantar IBOPE Media
- **Rodrigo Cascão**, Founder and CEO of EiTV



Sergio Eduardo Di Santoro Bruzetti, Engineering Planning Advisor - RecordTV

Graduated in Electrical Engineering, Postgraduate in Accounting and Financial Administration and in Software Engineering, he has worked in the broadcasting market since 1977, having held various positions in the engineering areas of TV Gazeta de SP, SBT and CNT. Currently at RecordTV, he coordinated the implementation of digital terrestrial transmission systems for its main broadcasters and currently coordinates the broadcast of international sporting events, such as the 2012 London Olympics, the 2014 Sochi Winter Games, the 2015 Toronto Pan American Games, the 2016 Rio Olympics and the 2019 Lima Pan American Games. He currently works as an Engineering Planning Advisor. He is coordinator of the Market Module of the Brazilian Terrestrial Digital TV Forum – SBTVD and advisor to the Television Engineering Society – SET



Luis Camargo, Media & Entertainment Business Developer Lead – Google Brazil | Pres. IAB Brazil Digital Video Committee | SET Advisor

Graduated in Advertising from Anhembi Morumbi, he has more than 13 years of experience in the marketing and technology industry, with stints at Predicta, where he led the media operations and new products teams for AdTech; and by Grupo Globo, where he collaborated in the creation of the programmatic media strategy in 2014. Furthermore, he chaired the IAB Brasil Digital Video Committee in 2018 and 2019 and has been part of the SET board since 2022. At Google for 9 years, He worked in the areas of advertising platform partnerships for Latam and Portugal, worked as a Google Cloud sales executive for the Media, Entertainment and Telecoms industry and today leads the area of developing Media and Entertainment partnerships and content on Google TV.



Paula Carvalho, Commercial Director of Media Owners, Kantar IBOPE Media

She has been a member of the commercial team at Kantar IBOPE Media for 9 years, currently as Commercial Director of Media Owners. Graduated in Advertising from Mackenzie and postgraduate in Consumer Science Applied to Marketing from ESPM SP, she began her career with qualitative research and in the last 17 years she has dedicated herself to Media Research working directly in different vehicles and also, already in Kantar, serving the most different customer profiles. Currently participates in the Measurement Committee at IAB



Rodrigo Cascão, Founder and CEO of EiTV

Rodrigo has a PhD in Computer Engineering and is a specialist in streaming and digital television technologies. He is the founder and CEO of EiTV, one of the first and main companies in the digital television sector operating in Brazil and Latin America. He is also the founder and advisor of the Brazilian Digital Television Forum. He has a specialization in technological innovation from Babson College and Stanford University. He currently lives in the United States where he has dedicated himself to studying the ATSC 3.0 standard and the next generation of digital television.

HOW FINOPS CAN MAKE A DIFFERENCE TO YOUR CLOUD STRATEGY

Did you know that cloud usage can be a powerful strategy for digitally transforming your technology infrastructure, enabling agility, innovation, and cost optimization? But how can you do this efficiently while ensuring scalability, flexibility, and resilience? This is where FinOps comes in – a methodology that helps your company gain proper visibility supported by data-driven processes and practices. In this talk, you will discover how FinOps has been helping us harness the full potential of the cloud efficiently.

Moderator: Rodrigo Andrade, Cloud SRE and FinOps Programs and Products Manager, Globo

- **WHAT IS FINOPS?**
Speaker: Thiago Azevedo, TAM Manager, Google
An overview of the methodology, its principles, and key capabilities that have been helping companies maximize their cloud investment.
- **GLOBO'S CLOUD JOURNEY WITH FINOPS**
Speaker: Fabiano Gomes Pereira, Infrastructure Coordinator – DevFinOps, Globo
How Globo Implemented FinOps Methodology and Core Capabilities in Practice While Undertaking its Journey of Migrating Platforms and Digital Products to the Cloud.
- **Marcos Arouca**, Cloud Architecture Development Manager, Globo



Rodrigo Andrade, Cloud SRE and FinOps Programs and Products Manager, Globo

Over the last 10 years I have been responsible for project management and IT Infrastructure programs, ranging from updating solutions and renewing the technology park to integration movements generated by the unification of the IT structures of TV Globo, Globo.com and Globosat, as well as the change management process involved. Over the last 5 years, a large part of the portfolio under my management has been linked to conception, management and measurement of value in Globo's public cloud migration programs. More recently I became responsible for Finops and SRE adoption initiatives at Globo leveraged by AIOps solutions. Graduated in Electrical Engineering

with an emphasis on Electronics from FESP-SP and MBA - Business Management from FGV with specializations with cloud certification with Cloud Digital Leader by Google, FinOps with FinOps Practitioner by Finops.org and Agility with A-CSPO by Scrum Alliance and PSM I by Scrum.org.



Thiago Azevedo, TAM Manager, Google

Graduated in Data Processing from FATEC-BS and MBA from The University of Manchester, working for the last 20 years on projects aimed at modernizing applications. Currently responsible for one of the Brazilian teams of Technical Account Managers (TAM) in the Google Cloud Consulting organization.



Fabiano Gomes Pereira, Infrastructure Coordinator – DevFinOps, Globo

Graduated in Electrical Engineering with an MBA in Management, Entrepreneurship and Business Development from PUC do Rio Grande do Sul, he works as FinOps and Infrastructure Coordinator at Globo. In the infrastructure area, he leads the DevFinOps teams and the management of the company's Cloud Budget, in addition to the teams that deal with the strategy for new migrations to the cloud and updating and innovation of the On-premises park. With more than 25 years of experience in technology projects area began his career in Broadcast systems projects with experience in several live events focused on content production for sports, entertainment and journalism, (Carnival, BBB, Copas Olímpicos). Since 2015, he started working with projects focused on Digital Media and IT infrastructure. In 2021, he participated in the process of platforming and transforming infrastructure towers into products, getting responsible for the team and the evolution of the DevFinOps product.



Marcos Arouca, Cloud Architecture Development Manager, Globo

Infrastructure Manager at Globo. Training in Systems Analysis and development at Estácio de Sá. Over 22 years of experience in infrastructure for content products and working at Globo for 17 years. Have you participated or still participates in projects such as BBB, Elections, Carnival and Olympics, on Globo. He is currently responsible for cloud architecture; Responsible for PaaS tsuru and basic infrastructure services at Globo.

MIGRATION OF SATELLITE DISHES: THE BEGINNING OF THE END

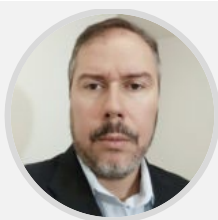
This panel will assess the satellite dish migration activities after 14 months since the start of the simulcast between C-band and Ku-band. The speakers will present the actions already undertaken and the results achieved so far. We will present the planning for the upcoming actions and discuss the challenges to successfully complete this extensive migration program.

Moderator: Wender Almeida de Souza, Technical engineering advisor, ABRATEL | Representative of the Central-West Region of SET

Co-moderator: Luiz Carlos Abrahão, ABERT Technology Director

Speakers:

- **Ana Eliza Faria e Silva**, Senior Manager of Technology Regulatory, Globo
- **Alfonso Aurin**, Managing Partner of Aurin Telecommunications consultancy
- **Antonio Parrini**, Director of Operations - EAF



Wender Almeida de Souza, Technical engineering advisor, ABRATEL | Representative of the Central-West Region of SET

Electrical engineer graduated from UFG. With more than 20 years of experience in the broadcasting sector, he works with regulatory analysis, preparation of technical projects for channel feasibility and licensing and installation of stations. He worked for 8 years at Anatel, in the now extinct SCM, and for the same period at EBC, in the Engineering and Operations Department. Currently works at Abratel.



Luiz Carlos Abrahão, Technology Director at ABERT

He is a Telecommunications engineer with specialization in the areas of TV Engineering and Business Management. He worked for more than 42 years at Rede Globo de Televisão, where he held various roles. He worked on projects such as, for example, the implementation of Estúdios Globo in Rio de Janeiro, coverage of major national and international events (Olympics, World Cup, Formula 1) and the implementation of the DF's digital TV Tower. He arrived at ABERT in 2018, where he holds the position of Technology Director.



Ana Eliza Faria e Silva, Senior Technology Regulatory Manager, Globo

Ana Eliza is senior regulatory manager in the strategy and technology area at Globo. In his 25-year career, he has led numerous innovative digital content distribution projects and played a prominent role in the various stages of Globo's and the sector's analogue-digital transition. He works in several technical media organizations, such as the Brazilian Society of Television Engineering and the Brazilian Digital TV System Forum. She has held several management positions in the telecommunications area, has contributed to ITU activities for two decades and has actively participated in the World Radiocommunications Conferences since 2007. She has a master's degree in Video Compression from UNICAMP, an MBA in Management and an MBA in Telecommunications.



Alfonso Aurin, Managing Partner of Aurin Telecommunications consultancy

Mackenzie University–Faculty of Technology - Electronic Operational Engineering Founding Partner of the Brazilian Society of Television Engineering - SET Member of the Technical Council of the Brazilian Association of Radio and Television Broadcasters – ABERT Participates in NAB for 23 years Member of the SET/ABERT Group – TV Digital Collaborator and Engineering Superintendent SBT – 28 Years Member of the GT – Migration – GAISPI / ANATEL Managing Partner of Aurin Telecommunications consultancy Managing Partner of Speedcast Multimedia Communication Service



Antonio Parrini, Operations Director - EAF

Professional with over 30 years of experience in Telecommunications. He held executive positions in operators such as Oi and GVT. He also worked in telecommunications infrastructure companies (Tower Company). He is currently the COO of EAF/Siga Antenado.

ENHANCING THE MEDIA EXPERIENCE: THE CONTRIBUTION OF ARTIFICIAL INTELLIGENCE IN CLOSED CAPTIONING, CONTENT CREATION, AND SPORTS PRODUCTION

Get ready for a unique and inspiring insight into the future of the media industry and discover how artificial intelligence is revolutionizing and driving a new era of possibilities! Join us in this exclusive panel discussion where we will explore the pivotal role of AI in these three areas.

Moderator: Valderéz de Almeida Donzelli, Technical Director of ADTHEC | SET advisor

- **AI FOR MEDIA: THE FUTURE OF CONTENT CREATION AND DISTRIBUTION**

Speaker: Hugo Nascimento, CTO of AD Digital | Coordinator of the “SET Industry 4.0” Working Group

Artificial intelligence (AI) is transforming the media market landscape, from the way content is created and distributed to the way it is consumed. In this presentation, AD-Digital CTO Hugo Nascimento will discuss the latest advances in AI for media and how they are being used to improve content production, distribution and monetization. He intends to discuss how our industry is using AI to boost its business.

- **THE USE OF ARTIFICIAL INTELLIGENCE IN SPORTS PRODUCTION AND JOURNALISM**

Speaker: Carlos E. O. Capellão, PHASE Engineering

The search for greater efficiency has always been a goal for broadcasting engineering and this has been facilitated with applications based on Artificial Intelligence. With the help of sensors, PTZ robotic heads and panoramic cameras, Artificial Intelligence is capable of performing image cuts and camera movements without any human

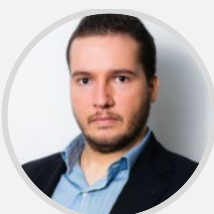
intervention. We would like to present some case studies of this model of operation at new and sports productions.

- **THE USE OF ML/AI TECHNIQUES IN THE AUTOMATIC CLOSED CAPTIONS GENERATION / CORRECTION / QC FOR FILES AND LIVE**
Speaker: Guilherme Castelo Branco, Director - Phase Engenharia
Closed captioning has been a requirement on open TV since 2006. The requirement was only for part of the daily content, but in 2017 closed captioning became mandatory for all programming. With the growing demand for VOD streaming and FAST channels, combined with the global reach of these platforms, the requirements to generate closed captions and subtitles in other languages for these contents has increased even more. Closed Caption generation is a time-consuming and costly job that also requires qualified professionals. The presentation will address how the use of ML/AI techniques such as NLP (Natural language Processing) and STT (Speech to Text) in the automatic closed captions generation has helped thousands of broadcasters around the world and the main challenges in using these technologies to the correct segmentation, punctuation, alignment, accuracy and correction of the generated files, since closed captioning is not just the transcription of audio into text.



Valderez de Almeida Donzelli, Technical Director of ADTHEC | SET advisor

Graduated from FEI in electronic engineering, electrical engineering and production. Master in electrical engineering. Postgraduate in Neurosciences from the Instituto Israelita Abert Einstein. Specialization in IT from FESP, ICT management and Project Management from FGV, Data Science from Awari, Advanced Digital TV System from INATEL and DMC – Mind Body Decoding with Dr Carlos Alberto Ribeiro. Develops research projects in connectivity, digital media and application of neuroscience concepts in engineering and human development. Director of Engineering, Technology and Regulatory at the engineering company ADTHEC (www.adthec.com.br), working in the areas of consultancy, planning, projects, training, research and solution analysis for radio, television and telecommunications stations from the public and private sector, with an emphasis on design and implementation of transmission systems. Participates in several working groups coordinated by Anatel, Ministry of Communications, Universities, Associations and Research Centers. The company is a member of theWent SBTVD. Member of the deliberative council of SET (Society of Television Engineering), of the technical committee of AESP (Association of Radio and Television Broadcasters of the state of São Paulo)



Hugo Nascimento, CTO at AD Digital | Coordinator of the “SET Industry 4.0” Working Group

With a background in engineering and more than 20 years of experience in projects for renowned companies in the market, Hugo Nascimento has a wide range of clients in different sectors. Throughout his career, he has collaborated with multidisciplinary teams in several countries, acquiring in-depth technical knowledge. At AD Digital, Hugo is responsible for the entire technical area, managing specialized teams and leading development and innovation initiatives.



Carlos E. O. Capellão, - PHASE Engenharia

Electronic Engineer graduated from UFRJ in 1974. MBA from FGV-RJ. Since 1973 he has worked in the Television and Telecommunications sector, having worked in the main TV Networks and at Embratel. In 1980 he founded PHASE Engenharia, a company he has run since then, working on the design and implementation of Television and Telecommunications Equipment and Systems. At Phase, we are constantly improving a wide range of Solutions for Television Projects through partnerships with leading international manufacturers in their segments. Founding partner of SET- Brazilian Society of Television Engineering, having held the positions of President and Director for many years.



Guilherme Castelo Branco, Director - Phase Engenharia

Graduated in Electronic Engineering from UFRJ, with a specialization in business management from FGV – SP, he has worked in the area of solutions for Television systems since 2004. He is currently a partner at Phase Engenharia and is based in São Paulo.

STREAMING: OPTIMIZING CONTENT DISTRIBUTION

Moderator: Marcelo Guerra, Head of Digital Media Platforms at Globo

- **DELIVERING CONTENT IN 4K DYNAMICALLY TO MILLIONS OF VIEWERS OVER THE INTERNET**

Speaker: Celso de Melo, Product Owner, Globo
In order to meeting market demands and the high expectations of our users, accustomed to Globo quality standard, we have built the Globo CDN. Delivering content in 4K with the performance and quality that has made us a reference in the market, the Globo CDN stands out for offering users the best consumption experience, transmitting content with high quality and low latency and buffering. The Qatar World Cup was a major case study for Globo in high-definition content delivery, achieving significant milestones such as 2.9 million simultaneous users on the platform and 2 million plays in a single minute. All matches were streamed in 4K to subscribers of Globoplay + Canais Ao Vivo, along with special programs and pre-match coverage. All of this was supported by the Globo CDN's resilient and modular architecture.

- **FAST CHANNELS**

Speaker: Paula Diniz, Product Owner, Globo
As a result of a behavioral change in current Brazilian following the behavior of world society, Fast Channels have been improving prominence within the products offered by Globo. Following these trends, together with the effort to maintain excellence in deliveries for users, gastronomy and sports fans, they have two new channels: Recipes Fast and GE Fast. They are totally focused on these subjects with dailly content.

Monetization is based on the insertion of more assertive advertising, using the DAI technology "Dynamic Ad Insertion", adding value for both the consumer and the advertiser.

To make these channels viable, we partnered with providers of cloud computing solutions for playout in the pursuit of greater efficiency, agility, scalability, and innovation.

- **LIVE ABR STREAMING LATENCY : ENABLING RELIABLE, SCALABLE, SECURE, FUTURE PROOF ULTRA LOW LATENCY (ULL) IN LIVE STREAMING**

Speaker: **Manuel Martinez Serruys**, Head of sales engineering LATAM D2C is increasingly augmenting – MVPD are increasingly shifting to ABR streaming with new revenue opportunities with increasing viewer options

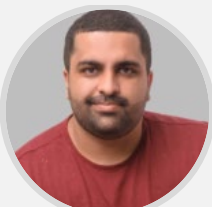
With content explosion, wide range of OTT connected devices It is also a global inevitable market direction with live video to become an important % of streaming traffic.

Consumers are actually winning the streaming war... Premium content, live events, sport events are increasingly demanding for better consumer experience translated to reliable/scalable ultra low latency live streaming with future proof to near live consumer interaction (betting) and meeting subscribers/fans demands in response to highly valued/premium live streaming events.



Marcelo Guerra, Head of Digital Media Platforms at Globo

With over 10 years of professional experience in the areas of video and streaming, ranging from Ingest and coding to CDN packaging and distribution, with a deep understanding of agile software development methodologies. Furthermore, my ability to lead design and development teams has resulted in the delivery of high-quality solutions, aligned with the strategic objectives of the business. Today leading a team of more than 120 professionals at Globo, developing and maintaining video and audio platforms (OVP) for a variety of Globo products, including Globoplay, news, sports and entertainment. Passionate about driving innovation and continuous improvement, always seeking new opportunities to learn and grow as a leader.



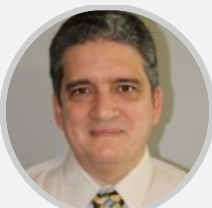
Celso de Melo, Product Owner, Globo

Celso de Melo has a degree in Information Technology Management, an MBA in Technology Project Management and a Project Management Professional (PMP®) certificate from PMI. Acts as Product Owner in Globo's Platform and Digital Product Projects team, responsible for the expansion and optimization of Globo CDN.



Paula Diniz, Product Owner, Globo

Paula is a Telecommunications Engineer with a postgraduate degree in Project Management. He has experience in the ICT, SATCOM, Broadcast and Streaming segments. Currently, he is responsible for creating and executing strategies on Globo's digital platforms and products, focusing on Streaming, VOD and FAST Channels.



Manuel Martinez Serruys, Head of sales engineering LATAM

Solutions architect with 20 years of design experience in the media and entertainment industry, in end-to-end streaming/broadcast solution integration activities in MVPD / broadcasters / D2C. Leading the Sales Engineering Group at MediaKind | Latin America to help clients search for media solutions according to their technology needs, operational business and consumer base. Customer-oriented mindset with

architecture, implementation and integration of E2E media streams (A/V pipeline) following a distributed architecture between local and public cloud with aaS solutions.

SATELLITE SOLUTIONS FOR THE NEW AUDIOVISUAL ECOSYSTEM

Keeping up with transformative movements driven by a series of state-of-the-art technologies, satellite operators are swiftly responding to the demands of a continuously evolving and often abrupt market to maintain their global leadership. Formerly viewed as providers that solely offered services based on leasing C-band and Ku-band transponders from traditional satellites, they now embrace the new era of new space and new ground as solution providers, leveraging various means and innovative resources such as cloud utilization, among others. In this context, the three major geostationary satellite operators, SES, INTELSAT, and EUTELSAT, present their solutions for content contribution, distribution, and delivery to different entities within the value chain of the new audiovisual ecosystem, including broadcasters, pay-TV operators, streaming services, FAST channels, and OTT platforms, among others. This panel offers an excellent opportunity to reassess outdated concepts that many professionals may still hold from the past.

Moderator: J.R. Cristovam, CEO, Technical Director of UNISAT TELECOM

- **IS THERE STILL ROOM FOR SATELLITE TRANSMISSION IN A CHANGING MARKET ENVIRONMENT?**

Presenter: Ignacio Gonzalez, Senior Regional VP Media Sales America, Eutelsat

As viewing habits evolve, the rise in OTT services and multi-device viewing has made video distribution more complex for broadcasters and service providers.

Multiple media formats, new devices and access methods and network infrastructure costs are all part of the challenge in delivering a cohesive, cost-effective, and cross-device, end-user experience.

Join us at SET EXPO where we will be discussing the reality of linear TV consumption today, the challenge in meeting evolving modes of content consumption, and how a simplified approach to content distribution with Native IP complements traditional broadcast and access to mobile screens for a consistent, quality TV experience, even beyond terrestrial boundaries.

- **INTELSAT MEDIA SERVICES: INNOVATION IN CONTENT DISTRIBUTION**

Speaker: Marcelo Amoedo, Senior Sales Director - Intelsat Broadcast Services, Brazil

Intelsat explores the transformation of the global media landscape, including specifically Brazil, and how it is adapting to meet the ever-evolving needs of modern

programmers. The company is innovating in hybrid distribution models and increasing investments in Brazil, including a new Media PoP in Rio de Janeiro.

- **PANORAMA AND PERSPECTIVES: SES MEDIA**

Speaker: Jurandir Pitsch, VP, Sales and Market Development - Video - Latin America, SES

SES will present a brief overview of the current broadcast industry landscape from its perspective, trends, and latest solutions included in its SES Media portfolio, including the most applicable ones for Broadcasters, DTH (Direct-to-Home), Occasional Use, IP Delivery, Cable Distribution, Channel Management, OTT (Over-The-Top), and SES 360.



J.R. Cristovam, CEO, Technical Director of UNISAT TELECOM

José Raimundo Cristóvam Nascimento, professor, researcher and international consultant for UNISAT Consultoria, Engenharia e Training for national and international entities in the TV, terrestrial and satellite telecommunications sectors, transport of audiovisual content via IP and non-IP networks and new communications technologies in a very broad way. Electronic Engineer for UFRJ/UGF, postgraduate degree in telecommunications for UFF and specialization in Japan (NEC) and the USA (TCSF). He worked as an engineer in the areas of terrestrial microwaves and TV centers for NEC do Brasil, from television for TELEBAHIA and satellite communications, commercial engineering and videoconferencing to the EMBRATEL. Creator in 2007 of the UFF MBA in Digital TV, Radio Broadcasting and New Mass Electronic Communication Media, where he held roles as content writer, technical coordinator and teacher. He has been organizing congresses, seminars, workshops, acting as moderator and giving lectures in different environments, academic and professional, in the country and abroad. He worked as a professor on undergraduate and postgraduate courses at different universities. Partner-founder, CEO/Technical Director of UNISAT TELECOM, creator, director and presenter of the fortnightly program TECH Fry Day on the UNISAT TELECOM YouTube channel, co-director of Portal SAT and long-time collaborator of SET.



Ignacio Gonzalez, Senior Regional VP Media Sales America, Eutelsat

Ignacio Gonzalez-Nunez is the Senior VP of Media Sales at Eutelsat in the Americas. Previously, he was VP of Business Development, Chief Group Risk Officer (CRO) and led the strategic expansion of Eutelsat's business in the Americas through the acquisition of Mexico's Satmex and obtaining Brazilian operating licenses. Prior to his position as CRO, he held the role of Advisor to the CEO, leading Eutelsat's corporate development and transformation projects, while serving as Regional Director for Spain and Latin America. After completing the 33% strategic investment in Hispasat, he served as Deputy CEO and CCO of Hispasat to facilitate the strategic partnership, achieving 33% revenue growth in 2 years. Ignacio was a member of the board of Eutelsat Latin America, 2014-2020. He was also deputy director of the European Satellite Operators Association, 2007-2014, representing Eutelsat, where he was elected VP in 2007. In 2018, he promoted the creation of the Colombian Space Agency, of which he is an associate member. Ignacio has an MBA from IE Business School and a master's degree in Satellite Technology and Communications Space for the University College London.



Marcelo Amoedo, Senior Sales Director - Intelsat Broadcast Services, Brazil

Business professional with more than 20 years of experience in the Broadcast market and knowledge in video transmission and compression systems, Digital TV and satellite communication services. At Intelsat he works as responsible for commercializing space segments for use in permanent broadcast services and occasional use, as well as managed media services. Computer Network Technologist, Bachelor of Business Administration and Postgraduate in MBA in Digital TV, Broadcasting and New Media.



Jurandir Pitsch, VP, Sales and Market Development - Video - Latin America, SES

Jurandir Pitsch is Commercial Vice President of Latin America South. He joined the company in 2002, after working at the Telebrás Research and Development Center and working in the areas of engineering, operations, development and vice-presidency of Marketing at Comsat Internacional do Brasil. Pitsch graduated in Electronic Engineering from the University of Campinas (Unicamp) in 1980. In 1991, after working as a systems engineer for the Telebrás Research and Development Center (CPqD), he joined Comsat Internacional in Brazil, where he worked in the areas engineering, operations and development products, becoming Vice President of Marketing in 1998. Jurandir joined SES in 2002 as Senior Sales Director for Latin America and in 2009 assumed the Vice Presidency of Market Development. In 2014, he returned to lead the sales and at the moment is Commercial Vice President for South Latin America. Jurandir Pitsch is a member of the Brazilian Satellite Association (Abrasat) and has written numerous articles regarding satellite communication.

EXPLORING THE POTENTIAL OF TV 3.0

Moderator: Marcelo Souza, Advisor to SET and Director of Technology for Digital Products at Globo

Speakers:

- **Renata Fernandes**, Director of digital advertising products at Globo
- **David Britto**, He is the CEO of Mirakulo Software
- **William Hessel**, Engagement Manager Latam, Google



Marcelo Souza, Advisor to SET and Director of Technology for Digital Products at Globo

Technology leader for Globo's digital products including Globoplay, Canalis Globo, Premiere Play, Combate Play, Globo.com sites and apps, G1, Globoesporte, GShow, Cartola, Cartola Express, Recipes and Giga Gloop. Graduated in electronic and computer engineering from UFRJ, master's degree in image processing from COPPE/UFRJ, MBA in business management from IBMEC-RJ and specialization course in Leading Product Innovation from Harvard Business School. For 21 years in the media industry, he has worked on digital video transmission projects, implementation of Digital TV in Brazil, TV channel distribution operations and Content Post Production, Strategic Planning, Advertising Technology (ADTECH), Technology Strategy in Digital Media and OTT/vMVPD Product Development.



Renata Fernandes, Director of digital advertising products at Globo

Renata Fernandes is director of digital advertising products at Globo. Graduated in journalism from UERJ and postgraduate in media management from the University of Westminster, she has been working in the digital ecosystem for over ten years. He is currently responsible for the digital advertising strategy for Globo portfolio products.



David Britto, CEO from Mirakulo Software

David Britto is a business administrator, with a postgraduate degree in production engineering from Universidade Federal Fluminense (UFF-RJ), and a postgraduate degree in Systems Analysis (CE-Candido Mendes). With more than 35 years of experience in managing teams in high-tech projects and developing solutions in the main computational domains. He is Founder and CEO of Mirakulo Software. He was founder and chairman of the board of directors of QualitySoftware and founder and Technology Director of TQTVD (a TOTVS group company), the latter focused on the development of AstroTV. Member of the deliberative council of Forum SBTVD and was a member of the Executive Committee of Java-JCP (Java Community Process).



William Hessel, Engagement Manager Latam , Google

Ad Tech specialist, with more than 15 years of experience in digital. At Google for over 4 years, he is currently Engagement Manager for the main publishers in Latin America, focusing on consultancy for monetization solutions.

CLOUD-BASED LIVE PRODUCTION: ENABLING MORE PRODUCTIONS AND CONTENT CREATION

In this panel, we will discuss several use cases from around the world of media companies that have adopted cloud-based technologies for live production, as well as recent innovations from technology companies focused on this field. Within these topics, we will address the key challenges and opportunities that arise during the adoption of cloud-based technologies for live production.

Moderator: Luis Duarte, Technology Director, TV Anhanguera

Speakers:

- **LIVE CLOUD PRODUCTION: ENABLING MORE PRODUCTIONS AND CONTENT GENERATION**

Speaker: Boris Kauffmann, Solutions Architect Broadcast Specialist at Amazon Web Services (AWS)

Many sports broadcasters own more rights to events than they have the ability to produce. Live Cloud Production enables networks, sports broadcasters, and production companies to keep up with the demand to produce more events. Plus, do this with smaller budgets and staffing. Running your live productions in the cloud doesn't mean have limited features and functionality, or constrained by the size of the event and the venue location. I would like to share lessons learned from these events, as well as share in-depth view of the architecture and technology. The in-depth review will touch on the entire process from; contribution feeds, vision switching, audio mixing, graphics, replay, comms, and signal routing and processing.

- **Benjamin Mariage**, Sales Director, CALA - Riedel Communications
- **Mateus Domingues**, Product Manager, TVU Networks



Luís Duarte, Technology Director, TV Anhanguera

Career spanning over 20 years in Technology and Innovation, with a focus on strategic planning and Digital Transformation. Passionate about applying technological innovation to business, I have a particular interest in the topics of Cloud Computing, Data Analytics, Artificial Intelligence and IoT, with several projects implemented. Currently, as Technology Director at Grupo Jaime Câmara, one of the largest media

groups in Brazil, an affiliate of Rede Globo for the states of Goiás and Tocantins, I am responsible for defining and implementing new technologies for the entire group, as well as managing from the Engineering, Systems, Cybersecurity and Product Innovation teams.



Boris Kauffmann, Broadcast Specialist Solutions Architect at Amazon Web Services (AWS)

He has over 15 years in the media industry, working in technology positions in broadcast, post-production and digital media preservation. Prior to AWS, he was responsible for the design and architecture of several IP-based video routing systems (SMPTE 2110) as a Solutions Engineer at Imagine Communications. Implemented several playout, master-control and routing systems in broadcasters in Latin America. Previously, he served as a Laboratory Technician at Cinemateca Brasileira, supervising migration and restoration workflows for films and videotapes in legacy formats. He has a degree in Electrical Engineering with an emphasis on Telecommunications from Universidade Presbiteriana Mackenzie in Brazil and is currently a master's student in the Postgraduate Program in Electrical and Computer Engineering at Universidade Presbiteriana Mackenzie, researching the transport layer of the new Brazilian Digital Television System (SBTVD 3.0).



Benjamin Mariage, Sales Director, CALA - Riedel Communications

I have worked in Latin America for the last 20 years (14 years at EVS and 6 years at SimplyLive). I am passionate about Latin America and I love the challenge of this complex market. I started at EVS in 2002 and established the business throughout Latin America over the next 14 years. I built local entities in Mexico and Brazil and established a network of partners. With our workflow solutions, I participated in the implementation of live production technologies at major events, such as World Cups and Olympic Games, up to the World Cup in Brazil in 2014, in partnership with the largest broadcasters in the CALA region. I then worked for SimplyLive, a new company on the market, offering innovative software-based solutions for live production. With Riedel's acquisition of SimplyLive in 2022, I became director of CALA for the entire Riedel portfolio. A new challenge to reconnect the Riedel company with the regional market in Latin America.



Mateus Domingues, Product Manager, TVU Networks

Electrical Engineer graduated from the Federal University of Itajubá, has more than 10 years of experience in the Broadcast market, working during this period as a Project Engineer, Pre-Sales and currently as Product Manager at TVU Networks.

APP DEVELOPMENT FOR OTT

With the growth of the streaming market, every new player entering this industry faces significant technological challenges and needs to make choices regarding sourcing models in development and the adoption of technologies and frameworks. In this panel, we will start by addressing the crucial decision of buy or build for streaming applications, taking into account factors such as personalization, costs, and platform control. Moving further into technology, we will discuss the challenges of multi-platform development, particularly for mobile and smart TVs, analyzing the specificities and best practices to optimize the user experience across these different device landscapes, considering factors such as performance, usability, and development costs.

Moderator: Daniel Monteiro, Head of Product Development & Technology - Globoplay

Speakers:

- **CROSS-PLATFORM APP DEVELOPMENT: BUILD OR BUY?**

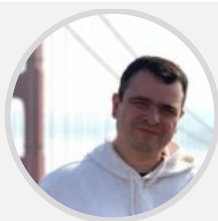
Speaker: Mauricio Finelli, Expansions and Partnerships Coordinator, Globo
A crucial decision that companies face when developing cross-platform applications is whether to build them in-house or buy from third-party vendors. In this presentation, we will analyze the pros and cons of each approach, assisting participants in making informed decisions. We will discuss advantages such as customization and full control, as well as the benefits of acquiring ready-made applications, such as cost reduction and faster deployment. We will also present the challenges of cross-platform development, considering evolution and maintenance. We will explore suitable use cases for each approach, empowering business owners, IT managers, and developers to make strategic decisions.

- **MOBILE DEVELOPMENT**

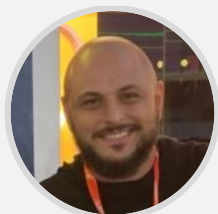
Speaker: Paula Tamaoki Guatura, Systems Architect – CI&T

- **BIG SCREENS AND THEIR CHALLENGES**

Speaker: Paloma Santucci, LatAm regional director - Accedo
Large screens have become mandatory in an OTT project considering their audience levels and representativeness of the video market. But what are the challenges of including smart TVs as part of a project scope? Which development models are most suitable for each type of need? How to ensure that these platforms offer the same quality of user experience for the audience in question? These and other answers will be addressed in Paloma's lecture, regional director for Latin America for Accedo.

**Daniel Monteiro, Head of Product Development & Technology - Globoplay**

Graduated in Electronic Engineering from UFRJ and passionate about new technologies, he joined Globo as an intern in 1998, working for 20 years in the areas research and development and innovation. Since the beginning of 2021, he has been at the forefront of Globoplay's product and technology development, leading the teams that create and develop Globoplay applications for all platforms.

**Mauricio Finelli, Expansions and Partnerships Coordinator, Globo**

Mauricio Finelli is a Telecommunications Engineer by training, having dedicated his work to the Media and Entertainment segment for the last 6 years. He currently works as Coordinator of Expansions and Development Partnerships at Globoplay, actively participating in the design and execution of Globo's digital video product strategy.

**Paula Tamaoki Guatura, Systems Architect – CI&T**

With around 12 years of experience in systems development, the last 7 of which were more focused in mobile applications, he works as a Systems Architect, helping teams with decisions regarding technology, strategy and team organization.

**Paloma Santucci, Regional Director LatAm - Accedo**

He began his career in the technology area working with VAS in 2008 providing WAP solutions for operators. In 2012 he worked at LG, where he led the Smart TV area in Brazil and entered the video market head-on. This year celebrates 10 years leading the Latin market for Accedo, managing large multi-platform projects for the main broadcasters and operators in this market.

PATTERNS AND PRACTICES FOR DIGITAL ADVERTISING: THE ROLE OF IAB IN THE BRAZILIAN SCENARIO

In this panel, we will explore, through presentations and discussions, the role of IAB (Interactive Advertising Bureau) in the digital landscape and highlight the importance of encouraging the adoption of standards and best practices in the online advertising industry. We will also present some of the research conducted by the Association, which provides valuable insights into CTV and data.

By promoting an agnostic and collective discussion on various topics related to digital advertising, we aim to analyze the impacts and challenges, as well as identify solutions and opportunities to establish a more transparent, ethical, and reliable environment for the entire ecosystem.

Moderator: Cris Camargo, CEO, IAB Brasil

Speakers:

- **Alexandre Kavinski, President of the Privacy and Personalization Committee at IAB Brasil**
- **Sabrina Balhes, Professor at IAB Brasil**



Cris Camargo, CEO, IAB Brasil

Cris Camargo is CEO of IAB Brasil, where he consolidated his trajectory as an impact business manager. At the same time, she is a professor at Miami AdSchool and an administration advisor at ALADAS and ABRAPHEM. Having worked at advertising agencies (MPM and Fbiz), he has also led marketing areas at companies such as C&A and Carrefour. With a Bachelor's degree in Social Communication, Cris has a postgraduate degree in Administration and Government Relations from Insper, in Non-Profit Business Leadership from Columbia University and certified as an Administration counselor from Dom Cabral.



Alexandre Kavinski, President of the Privacy and Personalization Committee at IAB Brasil

A pioneer in the search market in the country, Kavinski is CMO of Mirum Group and founder of i-Cherry, a WPP Group agency, which has clients such as Americanas SA, CVC, TIM, among others. After a long period in the United States market, he returned to Brazil at the beginning of 2019 to coordinate the agencies' marketing actions.



Sabrina Balhes, Professor at IAB Brasil

Graduated in Business Administration from EAESP-FGV, she joined Nielsen in 2009, where she worked for local and global clients in the consumer goods markets. Today she and her team are responsible for helping Nielsen advertisers, media outlets and agencies optimize their investments and validate metrics goals and successes for clear, reliable media data that is comparable across platforms for smart business decisions.

INFRASTRUCTURE SHARING: HOW TO HANDLE ITS MAINTENANCE

The year 2023 will come to a close with over 1500 retransmitters installed by the Digitaliza Brasil Program. Now, how will the sustainability of these stations be ensured? What are the responsibilities of the municipalities? What is the relationship with the broadcasters? These and other questions will be addressed in our panel.

Moderator: Francisco Peres, Coordinator of the SET Infrastructure Sharing GT

Speakers:

- **CHALLENGES AND SOLUTIONS FOR THE MAINTENANCE OF DIGITALIZA BRASIL PROGRAM STATIONS**

Speaker: Sérgio Martines, Executive Director - SM Facilities

As we approach the conclusion of the implementation of the multi-channel stations of the Digitaliza Brasil Program and the analog Switch-Off, a significant increase in the demand for services and solutions for the operation and maintenance of Digital TV retransmitting stations is imposed on television networks, in addition to a natural search for qualified professionals for its own staff.

Our almost exclusive experience and performance in this market allows us to collect a variety of information, research solutions and analyze the various options that are viable so that the installed base can be maintained at the appropriate cost and with a service that can bring the results that companies of the sector are looking for.

In this presentation, we intend to point out the state of the art regarding the maintenance and operation of these systems.

- **Carlos Eduardo Neiva Melo**, Supervisor of the Legislative Radio and TV Network - Chamber of Deputies
- **Tiago Facchin**, Telecom Manager, Globo
- **Wagner de Sousa Bastos**, Broadcast Planning Manager, EBC
- **Gunnar Bedicks**, CTO at Seja Digital
- **Luis Renato Giffoni**, Coordinator of the Administration Process of Basic Broadcasting Plans, Anatel
- **João Paulo Ribeiro**, Gerente Geral, Hitachi Kokusai Linear (HKL)



Francisco Peres, Coordinator of the SET Infrastructure Sharing GT

Graduated in Telecommunications Engineering from Universidade Federal Fluminense, Master's degree in Applied Electromagnetism from PUC-Rio and MBA from FGV. He is currently Manager of the Projects and Licensing area of Globo's Telecommunications systems.



Sérgio Martines, Executive Director - SM Facilities

32 years of professional experience in television, especially in the area of maintenance and implementation of transmission systems. Executive Director of SM Facilities, a television engineering services company. Professional in Project Management, PMP®, with experience as a consultant in various areas, such as finance, legal, industry and the third sector. Training in Civil Engineering – UFPR and Electronics Technician – Cefet-PR (currently UTFPR). MBA in Project Management – FGV, and Postgraduate in Construction Management – Cefet-PR. Vice-president of the Project Management Institute – Paraná Chapter (PMI-PR). Postgraduate professor (MBA) in project management at several institutions.



Carlos Eduardo Neiva Melo, Supervisor of the Legislative Radio and TV Network - Chamber of Deputies

Carlos Neiva – Communication Network engineer from UnB, specialist in Information Technology and training in Digital TV from NHK-CTI, Japan, Tokyo. He worked on broadcast channel planning and the implementation of the Brazilian Digital Television System as a Telecommunications Regulation Technician at Anatel, from 2009 to 2012. He has been a telecommunications engineer at the Chamber of Deputies since 2013, working on the implementation of the Legislative Network. Since 2021, he has been supervisor of the Legislative Network, technical advisor to ASTRAL and representative of ASTRAL in Gired, Gaispi and GT TV 3.0.



Tiago Facchin, Telecom Manager, Globo

Technology Executive with a Master's degree in Innovation and Business, an MBA in Project Management and a degree in Electrical Engineering. With more than 20 years of professional experience, he works as Telecom Support Manager, the area responsible for network and security infrastructures, transport systems, distribution and signal transmission at GLOBO.



Wagner de Sousa Bastos, Broadcast Planning Manager, EBC

Electrical Engineer and Computer Engineer from the Centro Universitário de Brasília. He began his career in 1998 and currently works as Broadcast Planning Manager at the Brazilian Communication Company - EBC. With 25 years of experience in the area, he participated in large projects within the company, such as Digitaliza Brasil. He has held positions such as Executive Engineering Manager and Director of Technology, Engineering and Operations within the Companies. Currently working on the EBC Radio and TV signal expansion project.



Gunnar Bedicks, CTO at Seja Digital

Gunnar Bedicks is a professor, researcher and telecommunications professional, working for over 30 years with devices, technologies and systems for analogue and digital communication. In 2013, he received the Order of Rio Branco from the Ministry of Foreign Affairs, for his role in expanding the Brazilian Digital TV System to countries in South America, Central America and Africa. Since 2015, he has held the position of CTO at Seja:Digital, an entity that was responsible for releasing the 700 MHz band for 4G, currently responsible for the implementation of the Digitaliza Brasil Program in

1,650 municipalities, for the implementation of the underwater optical cable from Infovia 01, from Norte Conectado Program, between Santarém and Manaus.



Luis Renato Giffoni, Coordinator of the Administration Process for Basic Broadcasting Plans, Anatel

Graduated in Electrical Engineering with an emphasis on Telecommunications and a postgraduate degree in Telecommunications Regulation from the University of Brasília (UnB). A career employee at Anatel since 2005, he held management positions in the areas of interconnection and numbering, as advisor to the Board of Directors and the Superintendence of Grants and Resources for Provision. He is a member of the Brazilian Communications Commission, which deals with matters related to telecommunications and broadcasting in international forums. Before Anatel, he worked at Brasil Telecom coordinating the planning and design of the company's IP and corporate networks.



João Paulo Ribeiro, General Manager, Hitachi Kokusai Linear (HKL)

With technical training in electronics and telecommunications engineering, he has been working in the broadcasting market since 2006. He participated in the main milestones in the implementation of Digital TV in Brazil, working in the development and installation of transmission equipment, in addition to having contributed to the development of standards through the SBTVD Forum and dissemination of knowledge as a speaker at SET events. He has experience in Digital TV projects outside Brazil, highlighting projects carried out in the United States and Argentina. He is currently responsible for the Seja Digital project by the company Hitachi Kokusai Linear, in addition to being responsible for other projects of relevance to the company.

GENERATIVE AI IN THE CREATIVE INDUSTRY: OPPORTUNITY OR THREAT

Moderator: Bruno Souza, Technology Director - Data & AI, Globo

Speakers:

- **Jeremias Klausner**, Data Science Manager, Globo
- **Paula Chimenti**, Center for Studies in Strategy and Innovation, Coppead/UFRJ
- **Gabriel Carvalho**, Key Account Director- Google Cloud



Bruno Souza, Technology Director - Data & AI, Globo

Bruno leads the strategy and development of data, analytics and artificial intelligence platforms for Globo's digital initiatives. He has a degree in Electronic and Computer Engineering from UFRJ, a master's degree in Computer Science/Machine Learning from PUC-RJ and an MBA in Executive Management from COPPEAD/UFRJ.



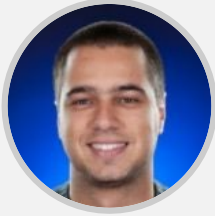
Jeremias Klausner, Data Science Manager, Globo

Jeremias is responsible for more than 30 data scientists, allocated to the Globo group's various digital products and platforms. He has worked in data science and artificial intelligence for over 20 years. I have a degree and master's degree in Electrical Engineering from PUC-RJ and an MBA in Executive Management from COPPEAD/UFRJ.



Paula Chimenti, Center for Studies in Strategy and Innovation, Coppead/UFRJ

PhD in Administration from the COPPEAD Institute of Administration (COPPEAD) of the Federal University of Rio de Janeiro (UFRJ) and Master in Administration from the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), where she also completed a Specialization in Marketing (IAG Master in Marketing) and graduated in Social Communication. Participated in the Global Colloquium on Participant Centered Learning, at Harvard Business School. Teaches the subjects of Soft Skills, Strategy and Innovation, Management of Platforms and Network Markets and Research Methodology in the Executive MBA, Master's and Doctorate courses at COPPEAD/UFRJ. He taught in the Global Partners MBA program at Georgia State University, IAE/Sorbonne and COPPEAD. Coordinates COPPEAD's Executive MBA program. She was a Teaching Advisor to the Graduate Education Council (CEPG) at UFRJ for two consecutive terms. She is the editor of teaching cases for RAC – Revista de Administração Contemporânea. She is coordinator of the Center for Studies in



Strategy and Innovation, where she develops research on the impact of innovations on business ecosystems. She has several works published in Brazil and abroad in the areas of strategy and innovation and works as a reviewer for national and international journals and conferences. His article on Business Ecosystems received first prize at the most important academic event in Brazilian Marketing. He worked in companies from different sectors, in the areas of marketing and communication. She works as a consultant for public and private organizations in the area of strategy and innovation.

Gabriel Carvalho, Key Account Director- Google Cloud

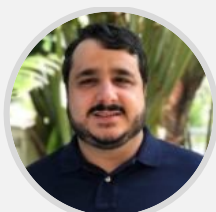
Gabriel Carvalho is the Executive Director responsible for servicing and executing the partnership with Grupo Globo. Having been at Google for 9 years, he has worked in several areas such as Business Development in Latin America on the Google Maps platform and led digital transformation and innovation projects through Cloud Computing. Bachelor in Geography from the Pontifical Catholic University of São Paulo (PUC-SP) and Master in Engineering with a focus on Information Systems from the Polytechnic School of the University of São Paulo (Poli-USP), he worked at Hexagon Brasil for more than 9 years, developing solutions in the Geotechnology market for different verticals such as Oil, Gas, Mining, Government and Public Security.

PODCASTS – THE PRESENT AND FUTURE OF AUDIO CONSUMPTION ON THE INTERNET

How the world of streaming and D2C has transformed the way we consume audio.

Moderator: Igor Macaubas, Director of Digital Platforms, Globo

- **Eliseu Barreira Junior**, Head of digital product portfolio management and paid channels
- **Priscilla Barsotti**, Sales Director at Spotify
- **M.M. Idoro**, Presenter, producer, screenwriter, author and director



Igor Macaubas, Director of Digital Platforms, Globo

Igor leads strategy, architecture, roadmap, engineering and evolution of technology platforms that enable all Globo digital products – from portals (G1, GE, GShow) to OTT products (Globoplay, Canalis Globo). He has a degree in information systems and has 2 MBAs, Business Management from IBMEC-RJ and executive management with a focus on finance and company valuation, from COPPEAD/UFRJ.



Eliseu Barreira Junior, HEAD OF DIGITAL PRODUCTS PORTFOLIO MANAGEMENT & PAID CHANNELS

Eliseu Barreira Junior is responsible for the strategy and content management of Globo's Entertainment profiles on social media, such as @bbb, @multishow and @gshow. He also leads Globo's strategy for the podcast market, having participated in the launch of titles such as "O Assunto" (g1), "Linha Direta - O Podcast" (tvglobo) and "Rita Lee, Outra Biografia - O Podcast" (globo books).



Priscilla Barsotti, Sales Director at Spotify

Based in the city of São Paulo, Priscilla Barsotti is Sales Director at Spotify. With more than six years at the company, he is responsible for disseminating Spotify Advertising solutions as a media platform for different brands and categories. Barsotti has more than 20 years of experience in the areas of Marketing and Sales with a focus on the digital segment and has worked in multinationals in Brazil such as Meta, Ford Motor Company and Terra Networks, and at Telefonica International, in Spain. He has a bachelor's degree in Advertising and studied an MBA (Master of Business Administration) in Marketing at Faculdade Cásper Líbero.



M.M. Izidoro, Presenter, producer, screenwriter, author and director

An eclectic creative, he was considered one of the 20 most creative people in the world by AdWeek magazine. He created the mental health platform #EuNão in partnership with Meta Brasil, the basketball podcast BIG SHOT POD and many others for HBO, Globoplay, RedBull and 99. He is the director and screenwriter of the project #AmarEloPrisma with Emicida, from the Casa Floresta podcast for Instituto Socioambiental, from the films "Amaré" and "O Diabo Mora Aqui", from the official audiobooks of the Harry Potter Saga in Portuguese, he was also a columnist for ECOA, UOL's social good platform and created and directed indigenous science fiction audiodramas "They Are Here" and the black romantic comedy "After Everything Changed" for Globoplay.

WEB3 AND METAVERSO

How the world of streaming and D2C has transformed the way we consume audio.

Presenter: Wagner Kojo, SET Advisor and SET eXPerience Full Connect Curator

- **Keynote Speaker: Paulinho Franqueira**, Principal Solutions Consultant - DMe
- **METaverse AND WEB 3 X EDUCATION AND AUDIOVISUAL COMMUNICATION**

Moderator: Márcio Lario, CEO, Kairos Innova Management & Innovation

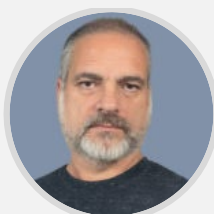
Considering the changes underway with WEB 3 and the development of applications related to the Metaverse, how do you see the future in terms of these technologies applied to the communication and audiovisual area?

- **Debater: Igor Sales**, Content Innovation Manager at +A Educação
- **Discussant: Paulo Cesar do Nascimento**, Consultant
- **Debater: Gabriel Lopes**, CEO @ EMPATHY



Wagner Kojo, SET Advisor and SET eXPerience Full Connect Curator

With consistent experience in business, marketing, innovation and technology over the last 10 years, he has assumed leadership positions in reference companies in the Technology and Communication sectors. Advisor, Consultant, Angel Investor, Curator and Speaker, Kojo, is also very close to the startup and digital business ecosystem and collaborates with strategic initiatives involving business schools, management and leadership, such as Inova Business School, FDC, HSM, MIT and INSEAD. Graduated in Marketing and Communication from Universidade Paulista, MBA from Business School São Paulo, specialization in International Business at UPC Barcelona Tech, post-MBA in TrendsInnovation and TrendsInnovation Advisor from Inova Business School and Member of ACTIB – Association of TrendsInnovation Advisors of Brazil.



Paulinho Franqueira, Lead Solutions Consultant - DMe

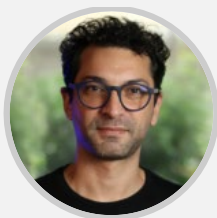
Since 1988, he has worked in the graphic and editorial production, design and communication market as a technical consultant, workflow analyst and instructor. He has worked in Adobe's Digital Media area for 14 years, helping users, companies and educational institutions to implement best practices and increase their efficiency through Creative Cloud tools.



Márcio Lario, CEO, Kairos Innova Gestão & Inovação

Graduated in Materials Engineering from UFSCar, Postgraduate from INPG in International Trade, MBA from FIA in Business Management and International Trade, Specializations at INSEAD - France in Senior Management Program and UCLA - Berkeley in Lean Startup Innovation. Experience in leadership positions (CEO, COO) and statutory positions, Presidency and Vice Presidency with South American and Global scopes in national and multinational companies such as Saint-Gobain, Nitroflex,

Sibelco-Unimim and Imerys, having been a member of the board of directors of Jundu Mining. Co-Founder of the company Safelive in Immersive and Digital learning technologies. Experience in Digitalization of Companies, Industry 4.0, Customer Experience and Customer Success. Support company professionalization processes, Strategic Planning, Implementation of steering and governance committees, business innovation processes, open innovation and startup ecosystems.



Igor Sales, Content Innovation Manager at +A Educação

Igor Sales has more than two decades of experience in multimedia projects integrating narrative, technology and audiovisual concepts. Co-founder of Imersys, an innovative and award-winning startup focused on applying Extended Realities (XR) in education, also helped establish XRBR, Brazil's leading hub for developers of XR solutions. In addition, he directs the web series "Irreversible: the protagonist learning", expanding the impact on the educational sector through audiovisual.



Paulo Cesar do Nascimento, Consultant

PC Nascimento, Mathematician with specialization in strategic service/IT management, has worked for over 25 years with innovation and in leadership positions in the technology industry, working for companies such as Sulamerica Seguros, XEROX and Samsung. For the last 10 years, he has worked at Samsung, always with software products and solutions, the last 5 years leading the mobile solutions area (Application Store, Theme Store, Mobile Ads, App Preload, etc.) and was responsible for Samsung Pay since launch in 2016 until the wallet became one of the leading solutions in the payments market. PC Nascimento also acts as a mentor for executives and entrepreneurs, counselor and advisor for startups and SMEs



Gabriel Lopes, CEO @ EMPATHY

Designer, teacher and scientist passionate about technology. Agent of innovation, a restless mind and passionate about challenges. Graduated in Design with specialization in packaging and artificial intelligence and data science from the University of Chicago. Certified Innovation Manager by the Boston Innovation Festival. A serial entrepreneur who loves the butterflies in his stomach and is not scared by the rollercoaster of business, he combined his 20 years of experience running several corporations in the creation of Empathy Company, a Technology Hub for Humans that operates under the DNA "Tech with heart, data with soul. Passionate about technology, connected by empathy!" In this performance Gabriel orchestrates the ideal combination between Creativity, Affective Computing, Data Science, People driven by Design and accelerated by Technology to map and develop emotional connections between brands and individuals, focusing on innovation, business prosperity and the soul connection between the human beings.

VIDEO STREAMING: CHALLENGES AND OPPORTUNITIES OF A CONVERGED ENVIRONMENT

Round table with executives from different and complementary areas, focusing on discussing challenges, trends, positionings and possible directions of this even more innovative and convergent video streaming industry environment.

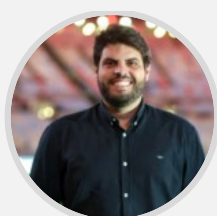
Moderator: José Schulz, Development and Technical Partnerships Manager, Globoplay, Globo

- **Debater: Eduardo Quintes**, Marketing Manager | Flamengo
- **Debater: Roberta Luzio**, Product Manager – Globoplay
- **Debater: Phillipe Carrasco**, Lead of Film, TV and Primetime Partnerships | Youtube
- **Debater: Nikolas Corbacho**, Product Manager | Always TCL



José Schulz, Development and Technical Partnerships Manager, Globoplay, Globo

Electronic engineer graduated from UFRJ, master's degree in computational optimization from Coppe, MBA in finance from Coppead and with 18 years of experience developed in various areas at Globo. He led teams and implementations in areas such as Research & Development, Technology Projects, Governance & Strategy and is now responsible for globoplay's development and technical partnership teams. Its main current focus is to transform the consumption of globoplay in the large screen environment, leading to a ubiquitous, unique and differentiated experience, in addition to working on the convergence between broadcast and broadband environments, developing hybrid TV.



Eduardo Quintes, Marketing Manager | Flamengo

At 33 years old, Eduardo Quintes has a degree in Advertising from PUC-Rio and a postgraduate degree in Entrepreneurship and Management from Saint Paul. Professional with more than 13 years of experience in the sports and entertainment business market, building own brands and managing sponsorships for companies such as Oi, Red Bull, Mercado Livre, Ambev, Banco BV, Adidas, TIM and others. In 2021, he began his journey as Marketing Manager at Clube de Regatas do Flamengo, initially working in the B2B vertical as responsible for the relationship with the more than 50 sponsor brands of the Club. Currently, he is responsible for the B2C business vertical, as Product Manager. In this position, he manages the fan's life cycle and consumption habits, through reference products in the sports market. It is worth highlighting Nação

Sócio-Torcedor, the relationship program with the highest revenue in Brazilian football; Fla-Anjo, the largest sports fundraising program via individuals in the country; and, finally, the most recent case in the football market: the unprecedented announcement of the partnership between FlaTV+, Flamengo's official OTT platform, and globoplay, the largest streaming platform in Brazil, which will bring even more convenience, practicality and much more content for red and black people.



Roberta Luzio, Product Manager – Globoplay

With an MBA in Business Management from FGV and CSPO and Product Management Leadership certificates, he currently holds the position of Product Manager at Globoplay, working on the construction and communication of product strategy, driving evolution through the union between business and technology and the orchestration of multidisciplinary teams. Passionate about people, strategy and digital products, she also has specializations in Social Media, Reputation and Branding and a postgraduate degree in People Management, career, leadership and coaching



Phillipe Carrasco, Lead of Film, TV and Primetime Partnerships | Youtube

Responsible for the strategy for TV, Streaming and Entertainment at YouTube Brazil. A consolidated professional in the audiovisual market, he has more than 20 years of experience in managing, directing and marketing content focused on production for TV, Radio, Cinema and Streaming. Implemented the strategy for Media Companies on YouTube for LATAM and integrated marketing strategies on YT Brasil



Nikolas Corbacho, Product Manager | Always TCL

Níkolás Corbacho is Product Manager at SEMP TCL. With more than 10 years of experience in product and category management, from the development and implementation of product strategies and roadmaps. The executive has a degree in mechanical engineering from PUCRS and an MBA from ESPM. He has expertise in brand management and all aspects related to go-to-market strategies for B2B and B2C channels.

THE NEW RADIO OF THE DIGITAL WORLD

The integration of traditional and digital elements is transforming radio into a new media. The listener-user experience is novel and expanded, creating a more complex relationship with the product and opening up new possibilities. Monetization models are also adapting to these transformations, incorporating new technologies and offering new opportunities. This panel will discuss how broadcasters are navigating the process of integrating into the digital universe and explore future perspectives.

Moderator: Marco Túlio Nascimento, Advisor to SET and Director of ZYDigital

- **NEW TECHNOLOGIES AND TRANSFORMATIONS IN PRODUCTION AND COMMERCIALIZATION MODELS**

Speaker: Rhadam Miranda, Radio Engineering and Operations Manager at RBS Group

The transformation of radio and its insertion into the digital environment demands new forms of content production. It also imposes profound changes in marketing processes, from new tools to new monetization models. The integration of operational flows – traditional and digital – and the incorporation of new technologies are strategic elements for the success of this transition process. This presentation will discuss this scenario, how broadcasters are managing these changes and how new technologies are transforming the business model.

- **THE DISSOLVED BOUNDARY BETWEEN RADIO AND TELEVISION IN THE DIGITAL DOMAIN**

Speaker: Jean Pierre Zanetti Vandresen, Technical Manager at Bandeirantes Communication Group

While traditional technology restricted radio to audio, the move to digital opened up the possibility for multimedia distribution of content. Many radio stations started broadcasting live video from the studio and, as a result, not only included cameras, switchers and lighting in their operations, but also needed to develop new training for their professionals. On the other hand, the language of live television has increasingly come closer to traditional radio formats such as talk shows, debates and round tables of commentators. In some cases, these traditional channels have even merged, presenting programs that are broadcast on a network, both by radio stations and television channels, with language appropriate to both media formats. This segment

of the panel will discuss how video is being incorporated into broadcasters' operations and will present cases of integration between radio and TV.

- **THE MONETIZATION OF MULTIPLATFORM RADIO**

Speaker: Rodrigo Tigre, Head of Audio at Adsmovil
In digital, radio is multiformat and multiplatform. Audio, text, image and video are dynamically combined and distributed across websites, apps and other platforms. In this context, programmatic media integrates with traditional processes to offer new monetization opportunities. This presentation will discuss market practices, implementation models and how radio stations should adapt their workflows to adapt to this new and more complex reality.



Marco Túlio Nascimento, Advisor to SET and Director of ZYDigital

Telecommunications Engineer graduated from Universidade Federal Fluminense and Member of the Deliberative Council of SET. With a career developed in the broadcasting area, he worked at Sistema Globo de Rádio where he held the role of General Technology Manager and was responsible for the Engineering, IT and Operations areas. He is currently director of ZYDIGITAL, a company he founded in 2015 and which operates in the technology and media market with the aim of contributing to the reinvention of radio, the creation of a new way of consuming audio, a new listening experience. ZYDIGITAL develops studies and solutions in the areas of radio, streaming, smartphone applications, voice applications and podcasting.



Rhadam Miranda, Radio Engineering and Operations Manager at Grupo RBS

Rhadam Miranda has a degree in Telecommunications Engineering from Universidade Regional de Blumenau (FURB), specialization in Project Management and Business Administration from FGV-RS, PMP certificate in Project Management from PMI and in SCRUM agile methods. He has worked in the broadcasting area for the RBS Group for 11 years, started his career as a project engineer at RBS TV, and currently manages the Engineering, Operations and Transmission areas of the RBS Group's radio stations.



Jean Pierre Zanetti Vandresen, Technical Manager at Grupo Bandeirantes de Comunicação

With a systemic, dynamic vision, project management, processes and execution, in the search for the best solutions with quality and results for the company. Development of OPEX and CAPEX of operations. Training in the technical area, engineering and certifications in networks (IT), with a focus on audio and IP systems in radio and television stations. Over the last 21 years, being in charge of two large radio networks, such as Grupo RBS and Grupo Bandeirantes, leading teams in the areas of engineering and internal and external operations, developing projects and solutions with manufacturers and suppliers, with emphasis on studios and central technique at Rádio Gaúcha and AoIP at Grupo Bandeirantes, in addition to planning and executing national events of all sizes and international events (4 World Cups, 3 Olympics, 3 Copa América, Champions League, Club World Cup, Pan American, F1) among other sporting, entertainment or journalism events.



Rodrigo Tigre, Head of Audio at Adsmovil

Rodrigo Tigre is Head of Audio at Adsmovil and author of “Podcast S.A.: a revolution in loud and clear sound”, a book that tells the story of the evolution of podcasts in Brazil. A digital entrepreneur since the age of 18, he began developing projects for the internet in 1996, including GamesMania and Netbyte, a games portal and e-commerce, respectively. In 2006, he created Feminice, a portal for the women's segment, which was later acquired by Bolsa de Mulher, where he served as Director of New Business. Since 2016 he has been working in the digital audio market where he worked as a local partner at Audio.ad until 2022 when the company was acquired by Entravision. He is currently the Head of Audio at Adsmovil, working to boost the audio market in Latin America and the United States, developing partnerships between local radio stations, podcasts and big brands. With his vast experience in entrepreneurship and his focus on digital audio, Rodrigo Tigre was also president of the IAB audio committee for 4 years where he is currently a professor of the Audio 360 and Games Advertising courses.

FUTURE OF TRANSFORMATION

Presenter: Wagner Kojo, SET Advisor and SET eXperience Full Connect Curator

WEB3 THE REVOLUTION YOU ARE NOT SEEING

Keynote Speaker: Robson Harada, CMO do MB Guild

ORGANIZATIONS FUTURE PROOF

Moderator: Renato Castro, Co-Founder, The Future of Transformation

General overview of maturity and the media ecosystem in Brazil. As we are? Will we be resilient to the next wave? What to expect from the communications and media sector in the future? What is the role of the media in future-proof organizations?

Debaters

- **Gustavo Verginelli**, COO of the Sportheca Group
- **Gabriel Villa**, Business Design - Martech, Claro BR
- **Dennis Garcia**, Advertising, Group Medium and Message
- **Hamilton Frausto**, Head of Customer Strategy, IBM



Wagner Kojo, SET Advisor and SET eXperience Full Connect Curator

With consistent experience in business, marketing, innovation and technology over the last 10 years, he has assumed leadership positions in reference companies in the Technology and Communication sectors. Advisor, Consultant, Angel Investor, Curator and Speaker, Kojo, is also very close to the startup and digital business ecosystem and collaborates with strategic initiatives involving business schools, management and leadership, such as Inova Business School, FDC, HSM, MIT and INSEAD. Graduated in Marketing and Communication from Universidade Paulista, MBA from Business School São Paulo, specialization in International Business at UPC Barcelona Tech, post-MBA in TrendsInnovation and TrendsInnovation Advisor from Inova Business School and Member of ACTIB – Association of TrendsInnovation Advisors of Brazil.



Robson Harada, CMO do MB Guild

Specialist in innovation and digital transformation in complex organizations and digital native companies. Currently CMO at MB Guild – the largest crypto exchange in Latin America, responsible for branding, content, experience and growth. Web 3.0 ambassador and enthusiast, on a mission to accelerate adoption and provide access to the benefits of blockchain technology. Active marketing professional and investor in the e-sports games segment. Catalytic member of Alma DAO and member of the boards of the Mobile Marketing Association, Grupo de Mídia de São Paulo and Dux Cripto. He worked in technology companies and large corporations such as Facebook, Uber, Google and Itaú Unibanco, developing businesses and methodologies for integrating marketing, growth and technology. Bachelor in Marketing and Information Systems.

**Renato Castro, Co-Founder, The Future of Transformation**

Businessman, serial entrepreneur and Nexialist, with 17 years of experience in the areas of creativity, communication, media, Martech and business strategies. He participated and led innovative projects in companies such as Itaú, Claro, Grupo GPA, Grupo Meio e Mensagem, Proxima, Magazine Luiza, in addition to acting as one of the first Journey Owner Consultant for IBM in Brazil. In 2018 he launched the TFT Platform - The Future of Transformation, where he is Co-Founder and responsible for creating new products. He founded Digital Land Empreendimentos e Inovação in 2015, where he works as head of strategies. He is responsible for the development of Nootropic Mindsetup in Brazil. Certified by Columbia Business School in Leadership in Digital Transformation, Graduated in Design and Advertising at Escola Panamericana de Arte and graduated in Process Management from Business School São Paulo. Advisor to Heads and founders of Startups in building innovative, customer-centric growth strategies.

**Gustavo Verginelli, COO of Grupo Sporthea**

With more than 15 years in leadership positions, Gustavo Verginelli is an advertiser by training, with a specialization in Data Science and 10 years of mathematics studies. Gustavo set up his first company in 2003. Since then he has founded Distrito, SportsMatch, Sporthea and Onefan, startups where he works 100% of the time with a focus on international expansion.

**Gabriel Villa, Business Design - Martech, Claro BR**

Gabriel Villa is a Martech at Claro. He is passionate about Marketplaces, advertising technologies and creating new businesses. He has extensive experience in payment methods and digital platforms, having worked at VTEX, Bradesco, ShopFacil, Amex, Credicard. He is a professor at Esecom, and a morse podcaster.

**Denis Garcia, Advertising, Grupo Meio and Mensagem**

For 16 years at Grupo Meio & Mensagem, working on different platforms and promoting connections between brands, vehicles and agencies.

**Hamilton Frausto, Head of Customer Strategy, IBM**

Head of CX IBM. Strategist with experience on different fronts, such as: Martech, Adtech, Omnichannel, CX, Digital Products, E2E Digitization, Customer Journey, CRM, among others.

STATE OF THE ART ON OTT VIDEO STREAMING

The expansion into emerging markets, the pursuit of greater personalization of the user experience through the use of AI, the growth of premium content, the increased competition from traditional media, the rise of 5G, and the growth of connected devices are some of the key trends and challenges for OTT video streaming in 2024 that will be discussed in this panel.

Moderator: SALUSTIANO FAGUNDES, CEO and Co-Founder

Speakers

- **Nina da Hora**, Computer scientist
- **Teresa Penna**, Globoplay Director
- **Luis Bianchi**, Marketing Director , LATAM and Roku Inc.
- **Andre Nava**, Business Director TV/Streaming @ Claro tv+



SALUSTIANO FAGUNDES, CEO and Co-Founder

An entrepreneur in the area of technological innovation, he is the founder and CEO of HXD Smart Solutions, one of the Brazilian companies that since 2007 has been “thinking and making the new television” with interactive software solutions for multiple video platforms. He was vice-president of SUCESU (Society of Computer and Telecommunications Users), evaluator of the Dorgival Brandão Software Quality and Productivity Award (MCTI/PBQP/Softex), created to promote quality improvement and increase the competitiveness of the Brazilian software industry. software; and member of the Deliberative Council of the Brazilian Terrestrial Digital TV System Forum. He is currently part of the team of curators at Campus Party Brasil and participates in the New Media Group of the Brazilian Society of Television Engineering.



Nina da Hora, Computer Scientist

AI researcher, speaker, writer, activist and influencer. He is a columnist for MIT Technology Review magazine and a member of the TikTok Security Council.



Teresa Penna, Director Globoplay

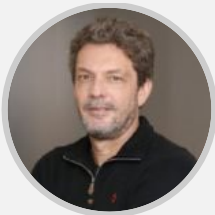
Executive focused on developing a customer-centric culture with quick results delivery aligned with the company's objectives (OKR and agile methodologies). He worked in leadership positions in Brazil, where he gained extensive experience and led the strategic agenda for Business & Operations with a focus on the D2C consumer journey. In 2006 he joined Globo and actively participated in the company's digital transformation.

He launched Globoplay in 2015 and was responsible for the strategy, evolution and management of the sales and after-sales journey for all of the Globo group's digital products, with a focus on maximizing the acquisition and profitability of the D2C base. In 2020, she launched Globoplay + Canals ao Vivo and is currently director of Globoplay and Produtos Digitais Audiovisuais (Globo Filmes)



Luis Bianchi, Marketing Director , LATAM and Roku Inc.

More than 20 years of career in Marketing and Business Development positions at companies such as Philips, Globo and Roku. He participated in the launch of the first Smart TVs in the Brazilian / Latam market in 2009, having since contributed to the development of the Streaming market.



Andre Nava, TV/Streaming Business Director @ Claro tv+

An engineer by training and with more than 25 years in the TV and digital video market, Andre Nava is one of the pioneers in the streaming market, being one of those responsible for launching the first TV Everywhere and vMVPD products in Brazil, respectively Globosat Play and o Globoplay + Canals ao Vivo. Currently, Nava is responsible for the end-to-end vision of Claro tv+ applications, whose main challenge is to consolidate the streaming TV business in the country.

UNCOVERING THE FUTURE OF RADIO AS A MULTIPLATFORM IN THE ERA OF VISUAL RADIO

The objective of the panel is to address the potential of radio, as well as the use of multiplatform content for regional engagement. Additionally, the panel aims to highlight the configuration of flows in audiovisual formats, introducing the concept of a complete solution for visual radio. This approach will promote an exchange of ideas and perspectives on the future of broadcasting, addressing new possibilities for content, monetization, and the importance of properly guiding and exploring this environment.

Moderator: Ronald Almeida, Technical Manager – Engineering, O Povo – Communication Group | SET Northeast Representative

Speakers

- **THE FUTURE OF RADIO AS A MULTI-PLATFORM CONTENT PLATFORM WITH ULTRA REGIONAL ENGAGEMENT**

Speaker: Thiago Fernandes, CEO of Nextdial and Director of Digital Audio at Abott's
In this talk, you will discover how radio is transforming into a multiplatform content platform with ultra regional engagement. This transformation allows radio stations to connect with their audiences in deeper, more meaningful ways, driving engagement and increasing listener loyalty.

You will also discover how radio stations are adapting and positioning themselves to take advantage of this opportunity by offering high-quality content and highly targeted advertising resources to their customers.

- **AUTOMATION DOESN'T SELL CREDIBILITY**

Speaker: Juliana Paiva, Director, Radiodata

The radio market only say two things. Investment in digital and data, but after the radio does all this, what happens?

Are radio professionals who work in commercials prepared to use all this information when searching for new advertisers?

What has your radio station done to attract new listeners, especially those from generation Z?

Market study carried out by Radiodata between February and April of this year revealed that most radio stations in the country have difficulty creating high-impact communication with advertisers and new generations.

- **THE DIGITAL TRANSFORMATION OF CBN RADIO**

Speaker: Thiago Barbosa, Digital product manager at Rádio CBN. We last years, the strategy CBN's digital network was placed at the center of business decisions. This development journey can be very valuable for other broadcasters and point to paths for the future. New distribution channels were found, better explored from a commercial point of view and also helping with data to understand the audience.



Ronald Almeida, Technical Manager – Engineering, O Povo – Communication Group | SET Northeast Representative

Engineer with over 17 years of experience in the Broadcasting area working on TV, radio and web portal stations. Developing activities related to Telecommunications, Engineering and IT. Working mainly in management, planning, maintenance, implementation of new projects, among others. Director of foreign relations at ACERT – Ceará Association of radio and television broadcasters (2nd Biennium). He worked on the operation and technical implementation of affiliated stations of TV Cultura, Canal Futura, SBT and Band, CBN, Nova Brasil and Globo radio stations, in the city of Fortaleza/CE.



Thiago Fernandes, CEO of Nextdial and Director of Digital Audio at Abott's

Thiago Fernandes, founder of Nextdial (@nextdialbr), a technology startup that is simplifying the lives of radio professionals, agencies and advertisers. He was an Evangelist at Microsoft and has a degree in Computer Science, an MBA in Software Engineering from ITA and a specialization in Marketing from ESPM.



Juliana Paiva, Director, Radiodata

Journalist specializing in audio communication. Works in strategic planning and management of media projects, managing partner of Radiodata, a content marketplace with more than 100 partner broadcasters. Serves clients such as UOL, CNN, Transamerica, Nova Brasil, Padre Marcelo Rossi, Flow Podcast, Rede Bahia, Rede Clube FM among others. He has worked on radio stations such as Jovem Pan, Rádio Globo and CBN. He was responsible for the expansion project of more than 70 affiliated stations of Sistema Globo de Rádio



Thiago Barbosa, Digital Product Manager at Rádio CBN

Thiago Barbosa is digital products manager at Rádio CBN. He is the creator of the podcasts “CBN Professional” and “Panorama CBN”. For 19 years at Rádio CBN, Thiago Barbosa was a reporter, editor, presenter and coordinator of the Belo Horizonte and Rio de Janeiro newsrooms. Before that, broadcast on TV Globo and Radios Eldorado, Trianon and Deutsche Welle, in Cologne, Germany.

THE POSSIBILITIES IN THE FACE OF THE RAPID TECHNOLOGICAL EVOLUTION OF TRANSMISSION AND RECEPTION SYSTEMS

The idea of the panel is to explore the subject of evolution of transmission systems, starting from the possibility of computerized simulation of 5G, to the evolution of open TV transmissions, which in digital allowed the operation of several transmitters on the same frequency, allowing the intersection of carriers, ending with the challenge faced in the reception process, considering the rapid evolution of transmission systems.

Moderator: **Silas Adauto do Nascimento**, Technical and Engineering Manager at RecordTV Brasília

Speakers

DIGITAL IRD CERTIFICATIONS – WHAT, WHY AND HOW?

Speaker: **Pasi Toiva**, VP, Business Development - Labwise by Allegro DVT SAS
Digital TV testing and certification are critical components of the digital broadcasting ecosystem. The benefits of digital TV testing and certification are numerous and far-reaching, ranging from improved quality and reliability to increased compatibility and interoperability. Firstly, digital TV testing and certification help to ensure that digital broadcasting systems are compatible and interoperable. Secondly, digital TV testing and certification help to improve the quality and reliability of digital TV signals. Finally, digital TV testing and certification help to maintain consumer confidence in digital TV systems. By ensuring that digital TV systems are reliable and of high quality, consumers are more likely to continue using these systems and recommending them to others.

5G CONNECTION SIMULATION AT 28 GHZ BETWEEN RBS AND USERS IN AN URBAN ENVIRONMENT

Thiago Schmoeller, CAE Applications Specialist
With the advent of new low latency and higher bandwidth technologies, ensuring a stable and secure connection for users has never been more necessary. A great ally of high technology companies is the use of computer simulation, allowing the study of various operating scenarios, ensuring a more optimized, safe and efficient system. In

this panel, we present a case study of the connection between 5G devices and a radio base station (RBS), operating at 28 GHz in an urban environment. Through the results, it is possible to optimize the operation of the system in question and prepare it to deal with the adversities of real urban environments. The use of computational simulation is a valuable tool for the design, analysis and development of modern communication systems, mitigating project risks and errors, and preventing technology companies from wasting their resources on field corrections of poorly sized systems.

IMPLEMENTATION OF SFN NETWORK

Speaker: Tomaso D'Angelo Wantuil Papi, Engineering and Technology Supervisor, RecordTV Brasília

This presentation will discuss the implementation of the SFN Network using both national and imported transmitters to ensure comprehensive coverage. It will address the harmonious and synchronous operation of the network, utilizing satellite transmission, digital radio, and IP networks as means of delivering the BTS signal to the SFN network transmitters.



Silas Adauto do Nascimento, Technical and Engineering Manager at RecordTV Brasília

Silas has over 36 years of experience in Broadcasting, working in public companies and TV stations commercials. He worked for many years in the support and maintenance of transmitters, starting from tube equipment to solid state transmitters, reaching the Digital TV revolution, which allows operation with SFN (Single Frequency Network).



Pasi Toiva, VP, Business Development - Labwise by Allegro DVT SAS

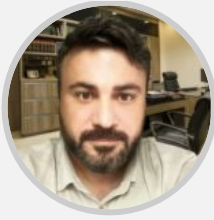
Pasi Toiva has more than 25 years of experience in the development, implementation and certification of digital TV receivers. Pasi began his career in digital TV working in STB development as a software engineering lead and project manager, developing one of the first DVB STBs that was deployed in the German market. After the development of STB, Pasi joined the Finnish Broadcasting Company to work as a project manager in the production, delivery and transmission of digital TV content and developed the infrastructure to prepare the broadcaster for the transition from analogue TV to digital TV broadcasts. Later, Pasi joined Ortikon Interactive to be the R&D manager at a digital TV application development company. During this time, Pasi led the development and deployment of value-added applications and head-end products. Pasi then embarked on the next career era in certifying digital TV receivers and was one of the founding partners and CEO of Labwise. Labwise is one of the leading companies that have successfully implemented the formal certification process for STBs and IDTVs in several countries.



Thiago Schmoeller, CAE Applications Specialist

He holds a Bachelor's degree in Electrical Engineering (2014) from Faculdade SATC, Criciúma. He also holds a Master's degree in Electrical Engineering from the Federal University of Santa Catarina (UFSC), where he carried out his research together with the Electromagnetism and Electromagnetic Compatibility Laboratory (MagLab). Professionally, he worked for more than ten years on the technology team at NSC TV, an affiliate of Rede Globo in Santa Catarina, with experience in the project and installation of radio and television studios, production and display systems, and audio and video

signal processing. Currently, he works as a CAE Application Specialist at ESSS, providing support to customers, mainly in the simulations of electric motor and transformer projects, using the Ansys Maxwell and Ansys MotorCad tools.



Tomaso D'Angelo Wantuil Papi, Engineering and Technology Supervisor, RecordTV Brasília

Tomaso Papi, is Engineering and Technology supervisor at RecordTV Brasília, has worked in broadcasting for over 12 years, has experience in all areas of a television station, from studio and external capture, production, exhibition, transmission, preparation of projects for TV, support, IT infrastructure for broadcast, Telecom and RF. He worked in the transition stage of the analogue-digital signal, led the process of activating the single frequency network (SFN) for digital TV in broadcasters affiliates from RecordTV. Graduated in Electrical Engineering with emphasis on Telecommunications and Postgraduate in Digital TV System from INATEL.

THE SECRET OF SUCCESS IN MEDIA PRODUCTION: A FULLY INTEGRATED WORKFLOW

Media production teams must be able to produce high-quality content quickly and efficiently, from capture to publication. A fully integrated workflow solution can help broadcasters and post-production teams achieve this by providing a seamless and efficient way to capture, edit and deliver content. This presentation will showcase a fully integrated workflow solution developed by Ross Video, SNS and Adobe.

Moderator: Carol Alberto Correia Garcia, Engineering Manager - Bandeirantes Radio and Television

Speakers:

- **Felipe Gonzalez**, Business Development Manager Latin America | Ross Video production workflow
- **Diego Buenaño**, Sales Director, Latin America at Studio Network Solutions (SNS)
- **Luis Bechtold**, Strategic Manager - Adobe Systems



Carol Alberto Correia Garcia, Engineering Manager - Bandeirantes Radio and Television

Electrical Engineer and Production Engineer from FEI, has been working in the television and content production market for 18 years, managing and leading implementation, integration and operation processes of integrated systems such as MAM, automation, video servers, graphics, among others. Participated in events such as the World Cup and the Olympics with the usability and applicability of these solutions. Acts as engineering manager at RTV Bandeirantes, leading the technical areas of systems, implementation, media center and exhibition center, operationalizing and guiding the broadcaster's workflow, between the areas of journalism, sport and entertainment for a better production and delivery flow. of content.



Felipe Gonzalez, Business Development Manager Latin America | Ross Video production workflow

I am an Audio Engineer at my core, but as part of an evolution in my professional journey, I became a Digital Media Engineer after spending the last 25+ years in the Post Production, Education and Broadcast markets, now working as BDM (Business Development Manager) for Latin America at Ross Video, in the Production Workflow Group. As BDM for Latin America, I have worked with the Sales and Marketing teams to

create localized documents in Spanish and Portuguese, demonstration videos and worked shoulder to shoulder to promote new products in the region.



Diego Buenaño, Sales Director, Latin America at Studio Network Solutions (SNS)

Diego Buenaño is the Director of Sales for Latin America at SNS, the creators of EVO shared storage and the award-winning EVO Suite. In his 20+ years of experience serving creative communities in Latin America, he has worked as a Creative Director and Consultant in the Broadcast, Production and Post-Production markets, where he designed and implemented workflows for creative teams. He continues to advise on workflow solutions in his role at SNS.



Luis Bechtold, Gerente Estratégico - Adobe Systems

Currently leading Adobe Strategic Development of Adobe Creative Cloud Enterprise SaaS Solutions with Enterprise Customers and Industry Partners to accelerate business growth and product innovation. Client-focused leader with over 20 years of experience in the Digital Media and Entertainment Industry.

INDEPENDENT JOURNALISM: MERIT, VIRTUE OR ESSENTIAL?

Discover news content providers in Brazil that are not affiliated with broadcast stations. These are companies that generate news, both nationally and internationally, with independence, relentlessly seeking the reality of facts rather than a biased version of them. They dedicate themselves to meeting informative and educational demands at the local level, serving as a source of public utility.

How do they share editorial responsibility with broadcasting outlets, and how do they coexist and sustain themselves?

Also, get to know the operations of the news-generating broadcaster Radio Jovem Pan and the phenomenon of audience growth in Greater São Paulo with the arrival of the new station at 76.7 MHz – and its network distribution across Brazil, on Radio and TV.

Moderator: Juliana Paiva, Director, Radiodata

Speakers:

- **RADIOWEB AGENCY, NEWS NOT JUST ON THE WEB!**

Speaker: Rita Helena Faustino, Relationship Manager at Radioweb Group
The Agency in essence distributes news via the WEB and also via broadcasting stations. Rita Helena Faustino will present the company, its operations and how it will maintain distribution across hundreds of stations throughout Brazil for years.

- **RADIOWEB AGENCY; NEWS AGENCY ONLY?**

Speaker: Alexandra Fiori, Coordinator of RadioWeb Agency
Find out what RadioWeb does, and the radio release model with a journalistic approach with an average time of two minutes. The power of synthesizing the message according to the programming profile of the partner broadcaster.
Coverage of stations and potential listeners.
Audit of radio programming.
Corporate Radio, Integration with social networks and accessibility.
The PodCast channel and other information about the Agency.

- **AND WHAT ABOUT THE NEWS? DOES IT HAVE A GUARDIAN? LOCAL AND REGIONAL JOURNALISM**

Speaker: Gabrielle Tricanico, Director, The Guardian of the News
Oneagency news special, A GUARDIÃ DA NOTÍCIA, with a local focus on

communities. Acts with ease with actions of utility disseminating public utility with municipal governments, education and health departments.

Administrator and journalist Gabrielle Tricanico will set the tone for local journalism in support of actions to support populations. Identify on your website and distribution of News It is segmentation in several locations, with personalized actions.

- **Speaker: Carlos Aros, Content Director Rede Jovem Pan News**



Juliana Paiva, Director, Radiodata

Journalist specializing in audio communication. Works in strategic planning and management of media projects, managing partner of Radiodata, a content marketplace with more than 100 partner broadcasters. Serves clients such as UOL, CNN, Transamérica, Nova Brasil, Padre Marcelo Rossi, Flow Podcast, Rede Bahia, Rede Clube FM among others. He has worked on radio stations such as Jovem Pan, Rádio Globo and CBN. He was responsible for the expansion project of more than 70 affiliated stations of Sistema Globo de Rádio.



Rita Helena Faustino, Relationship Manager at Radioweb Group

Having worked for over 20 years in the broadcasting segment, specializing in business and customer service. Manager of the Radioweb Group's Relationship sector since 2021, her objective is to maximize relationships with partner radio stations, encouraging the expansion of affiliates, as well as promoting qualified service to broadcasters. In addition, she also works as a Trainer and Speaker.



Alexandra Fiori, Coordinator of RadioWeb Agency

Journalist from the Pontifical Catholic University of Rio Grande do Sul (1996), specialist in Political Science from the University of Brasília (2007), he worked as a reporter for Rádio e TV Bandeirantes, in Porto Alegre (RS) where he specialized in the Politics and presenting programs for radio and TV. Since 2004, he has worked in Brasília (DF) coordinating Journalism at the Radioweb Agency, having previously coordinated Rádio Justiça, of the Federal Supreme Court, from 2011 to 2014.



Gabrielle Tricanico, Director, A Guardian of the News

I am a professional in the field of communication, qualified as a journalist MTB 44611/SP and DRT Locução 28.865/SP with solid experience in political campaigns, ceremonies, reporting, creation and production of content and voiceover for radio and TV. My trajectory and good reputation in the market were recognized through a lot of effort in training and leading teams, for acting with great willingness. I have a degree in social communication - journalism from Universidade Nove de Julho, in Public Management from Universidade Anhanguera, a postgraduate degree in digital journalism from Cásper Líbero.



Carlos Aros, Content Director Rede Jovem Pan News

Content Director of Rede Jovem Pan News, journalist specializing in Technology and Innovation, executive editor of MIT Technology Review Brasil.

IA IN COMMUNICATION STUDIES. CASES AND INFERENCES

The academic panel SET/TV UNESP presents an unmissable debate on Artificial Intelligence (AI) and the innovative research being conducted in both theoretical and practical fields. Get ready for a fascinating journey into the world of AI and its revolutionary applications in the audiovisual field. In this panel, we will bring together AI experts and invited researchers with the aim of exploring the latest findings, trends, and challenges faced in the field of AI. The invited professors will share their knowledge and experiences. In addition to the lectures, the panel will provide an environment conducive to valuable interactions and idea exchanges among participants and the audience.

Moderator: Prof. Doctor Fernando Carlos Moura, Editor-in-chief of SET Magazine

Speakers:

- **Prof. Dr. Francisco Machado Filho**, Assistant professor at the São Paulo State University Júlio de Mesquita Filho

- **AUDIOVISUAL AND ARTIFICIAL INTELLIGENCE: AUTONOMOUS TEXT CONTENT PRODUCTION**

Speaker: Prof. Dr. Ana Silvia Lopes Davi Médola, UNESP

The generation of audiovisual texts using Artificial Intelligence (AI) resources has reached an advanced technical level, and its results require further improvement in the process of enjoyment and meaning production in communicative relationships. The issue of the semantic and modal competence of the receiver in interpreting the contents circulating in communication that incorporates generative AI is essential for understanding messages increasingly processed by machines. Beyond the perspective of changes in production processes and impacts on the job market in the audiovisual sector, it is necessary to critically examine the origin, quality, and use of content derived from autonomous systems and their impact on communication.

- **ARTIFICIAL INTELLIGENCE IN AUDIOVISUAL PRODUCTION AND DISINFORMATION: TELEVISION AS A TOOL FOR MEDIA EDUCATION**

Speaker: Prof. Dr. Kellyanne Alves, Lavid/UFPB

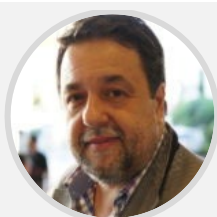
AI, by simulating human intelligence, applies two principles: “machine learning” and “deep learning.” Through these techniques, systems are capable of performing complex tasks without human interaction, autonomously learning and using information through data processing and analysis to understand patterns and optimize

processes. However, it is important to analyze the various effects that this can generate. When AI is used to generate disinformation and manipulation, it becomes a risk, and audience awareness is essential when consuming such content.

- **PRACTICAL ANALYSIS OF SOME TOOLS FOR CONTENT CREATION USING ARTIFICIAL INTELLIGENCE**

Speaker: Prof. Dr. Fernando Moreira, Former president of the Brazilian University Television Association (ABTU)

The presentation will analyze the AI tools used in content production, from generating texts and scripts to generative image filling and video editing. The talk will showcase case studies of development in these areas.



Prof. Doctor Fernando Carlos Moura, Editor-in-Chief of the SET Magazine

Fernando Carlos Moura has a PhD in Language and Communication Sciences with a specialty in Communication and Culture from Universidade Nova de Lisboa, Portugal. Editor-in-Chief of the SET Magazine since 2013 and post-doctoral fellow in the Studies Program Posdoctorales PEP-UNTREF, director of the Applied Research Program Project on Audiovisual Narratives in Times of Convergence Digital and Cultural at UNTREF and professor of the Degree in Audiovisual Production at the National University of Trés de Febrero (UNTREF), Buenos Aires, Argentina. Researcher associated with the Brazilian Digital Television Observatory (Obted).



Prof. Dr. Francisco Machado Filho, Assistant Professor at the Universidade Estadual Paulista Júlio de Mesquita Filho

He has a degree in Social Communication Radio and TV Qualification – Faculdades Espírito Santense (1999), a master's degree in Communication from the University of Marília (2006) and a doctorate in Social Communication from the Methodist University of São Paulo (2011). He is currently an assistant professor at the Universidade Estadual Paulista Júlio de Mesquita Filho. He has experience in the area of Communication, with an emphasis on Radio and Television, working mainly on the following topics: communication and technology, convergence, internet, digital TV and business model. It's ViceCoordinator of the Television Research Group and Tele Visualities of Intercom and Director of TV UNESP.



Prof. Dr. Ana Silvia Lopes Davi Médola, - UNESP

Associate Professor in Televisual Communication at Universidade Estadual Paulista UNESP - in Bauru/SP, where she is assigned to the Department of Social Communication working as a teacher in the Social Communication Course: Radio, Television and Internet. Accredited as a permanent professor in the Postgraduate Program in Communication at UNESP (master's and doctorate). PhD in Communication and Semiotics from PUC/SP, develops analyzes on audiovisual language and television aesthetics. Graduated in Journalism and History, she worked on Rede Globo and the now extinct Rede Manchete stations. Director of TV Unesp (2010-2017). In research activities, he is leader of GEA - Audiovisual Studies Group at UNESP and member of the Center for Sociosemiotic Research (PUC-SP, USP-FFLCH, CNRS-Paris). Scientific production is concentrated in the studies of communication, television, audiovisual

language semiotics, and recorded in book chapters and articles published in scientific journals.



Prof. Dr. Kellyanne Alves, - Lavid/UFPB

Professor at the Department of Communication at University Federal Government of Paraíba (UFPB). PhD in Communication from the Federal University of Pernambuco (UFPE) with a doctoral internship at Universitat Pompeu Fabra, in Barcelona, Spain. Researcher at the Digital Applications Laboratory Research Center - LAVID, at the Informatics Center, at UFPB. Researcher at GP Television Studies and Tele Visualities yes Intercom. Teacher in Digital Television: Information and Knowledge from the Postgraduate Course in Digital TV at Universidade Estadual Paulista (2010), studying in the field of Information and Communication Management for Digital TV. Bachelor in Social Communication with specialization in Broadcasting from the Federal University of Paraíba - UFPB (2007). Bachelor in Social Communication with specialization in Journalism at UFPB (2009). Author of the book Active Sources: collaboration of active audiences on television news in Brazil and Spain.



Prof. Dr. Fernando Moreira, Former President of the Brazilian University Television Association (ABTU)

Fernando José Garcia Moreira is a consultant in audiovisual technology with extensive experience in developing projects for studios and audiovisual production centers. He holds a Ph.D. in Social Communication with research focused on communication processes and interactivity of Digital TV. He also has a Master's degree in Social Communication with research in Information and Communication Technologies applied to Education, as well as a degree in Pedagogy. As a professor of production and audiovisual technology courses, he was the creator and director of TV Univap from 1997 to 2020, and served as the coordinator of the Radio and TV program at Univap from 2017 to 2020. He is also an author with contributions to 12 books and articles published in national and international journals. He has been a speaker at events in Brazil, Argentina, Mexico, Peru, Chile, the Dominican Republic, the United States, and Spain. He previously served as the President of the Brazilian Association of University Television (ABTU) and was a member of the Board of Directors of the Association of Educational and Cultural Ibero-American Television (ATEI). He is a member of the Brazilian Society of Television Engineering (SET).

INNOVATION AND THE FUTURE FROM DIFFERENT PERSPECTIVES

In this panel, we will discuss the factors of data, market demand for professionals, and delivery capabilities, as well as a practical view from those who experience innovation on a daily basis within a cutting-edge nerve center.

Moderator: **Hugo Nascimento**, CTO of AD Digital | Coordinator of the “SET Industry 4.0” Working Group

Speakers:

- **THE FUTURE OF VIDEO**

Speaker: **Juliana Paiva**, Strategic Partnerships Leader, Google
Insights on the future of video distribution in the Brazilian market.

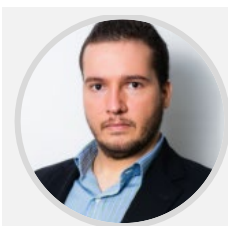
- **FROM CONCEPT TO REALITY: TRANSFORMING INNOVATION INTO PRODUCT**
Speaker: **Daniel Monteiro**, Head of Product Development & Technology - Globoplay

- **INNOVATION IS MADE BY PEOPLE AND NOT JUST TECHNOLOGY**

Speaker: **Maria Augusta Orofino**, CEO, Mabiz
Innovative companies work with agile methodologies, rely on disruptive business models and operate with a customer focus. You must certainly remember many success stories of startups that became unicorns that operate with these and other characteristics.

But what skills do leaders and their teams need to make innovation happen? How can we create innovation made from people to people when we have, in the job market, four generations working at the same time?

Creativity, ability to solve complex problems, collaboration, resilience and antifragility are some of the fundamental soft skills. And fostering multidisciplinary, diverse, inventive and creative teams is not impossible.



Hugo Nascimento, CTO at AD Digital | Coordinator of the “SET Industry 4.0” Working Group

With a background in engineering and more than 20 years of experience in projects for renowned companies in the market, Hugo Nascimento has a wide range of clients in different sectors. Throughout his career, he has collaborated with multidisciplinary teams in several countries, acquiring in-depth technical knowledge. At AD Digital, Hugo is

responsible for the entire technical area, managing specialized teams and leading development and innovation initiatives.



Juliana Paiva, Strategic Partnerships Leader, Google

Advertising professional with over 20 years of experience in curating and producing audio and video content. Management of integrated projects for media companies with an emphasis on expansion and consumption for companies such as Rádios CBN and Globo, CNN Rádio/Rede Transamérica, UOL, Nova Brasil and The Antagonist.



Daniel Monteiro, Head of Product Development & Technology - Globoplay

Graduated in Electronic Engineering from UFRJ and passionate about new technologies, he joined Globo as an intern in 1998, working for 20 years in areas of research and development and innovation. Since the beginning of 2021, he has been at the forefront of Globoplay's product and technology development, leading the teams that create and develop Globoplay applications for all platforms.



Maria Augusta Orofino, CEO, Mabiz

Speaker, researcher, TEDx Talker, corporate educator in the areas of Innovation, Leadership and Agile Methodologies. Author of the book Leadership for Innovation, published by AltaBooks. Co-author of the books Jornada Ágil and Business Model You. Recognized and awarded by ABTD-PR as Personality of the Year in HR, in 2021 and Top of Mind HSM Academy 2021 and 2022. Considered as one of the 50 names that multiply creativity in Brazil, in 2022, by Wired Festival magazine. Teacher at ESPM, HSM Academy, and Sustentare. Content writer and presenter of training programs at UOL Edtech, Grupo Anima and HSM University. Its client portfolio includes Vale, TIM, Claro, Electrolux, Ultracargo, Mitutoyo, DOW, Abbot, Unilever among others. He has a Master's degree in Knowledge Management with extension courses taken at Duke University and UC Berkeley – USA and University of Barcelona – Spain.

RADIO REGULATION, WITH PARTICIPATION OF ANATEL AND THE MINISTRY OF COMMUNICATIONS

Recent research confirms that radio remains a global leader in coverage and audience. Leveraging the power of audio and “visual” aspects through its technical peculiarities of subcarriers, such as RDS (Radio Data System), disciplined and evolving in-car receivers, and the inevitable hybrid radio and connectivity. As a result, coverage standardization becomes crucial for preserving the service model, with antenna validation and their radiation patterns. Discrepancies between licensed and covered areas, as well as the impact on licensing fees and spectral interference, will also be addressed.

The panel will be moderated by members of the SET Radio Group, who will highlight the need to enhance spectral preservation, considering the scarcity of frequencies even after the adoption of extended frequency bands in metropolitan areas, particularly in São Paulo.

Moderator: JOSÉ MAURO DE ÁVILA, Technical director/ Mega Communication System in Ribeirão Preto - SP

Co-moderator: Valderez de Almeida Donzelli, Technical Director of ADTHEC | SET advisor

Speakers:

ANATEL REGULATORY PARTICIPATION / ANTENNA DIAGRAM / CONSIDERATIONS

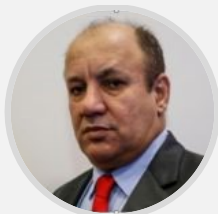
Speaker: Paulo Eduardo dos Reis Cardoso, Coordinator of Broadcasting Management Systems and Models, Anatel

MCOM REGULATORY PARTICIPATION / CONSIDERATIONS ON THE VALUE OF FM BROADCAST LICENSES

Speaker: ANTONIO MALVA NETO, Director of the Private Broadcasting Department, MCom

SPECTRUM CENTER - SOFTWARE SPECTRUM-E / MOSAIC ARCHITECTURE AND WORKFLOW

Speaker: Pierre Missud, CEO of Spectrum Center Inc.



JOSÉ MAURO DE ÁVILA, Technical Director/ Mega Communication System in Ribeirão Preto - SP

Electrical Engineer and Occupational Safety Engineer from Universidade Paulista in 2008. Electronics Technician from Moura Lacerda Institution in 1982. Has been attending the NAB - Broadcast Engineering Conference since 1992. Participates in various seminars organized by Brazilian entities focused on the industry, such as AESP, SET, and ABERT. Broadcast Electronics - Product Training Seminar - Audiovault Administrator/VAR Sales - 1999/2000/2002/2006/2013; Harris Corporation - Focus: Harris HT 35FM transmitter - 1991. Currently serves as the Technical Director of Mega Communication System and holds the Vice Leadership position in the Technical Committee of AESP since 2012, participates in the radio group of SET, and provides technical support for Broadcast Electronics automation systems in Brazil.



Valderez de Almeida Donzelli, Technical Director of ADTHEC | SET advisor

Graduated from FEI in electronic engineering, electrical engineering and production. Master in electrical engineering. Postgraduate in Neurosciences from the Instituto Israelita Abert Einstein. Specialization in IT from FESP, ICT management and Project Management from FGV, Data Science from Awari, Advanced Digital TV System from INATEL and DMC – Mind Body Decoding with Dr Carlos Alberto Ribeiro. Develops research projects in connectivity, digital media and application of neuroscience concepts in engineering and human development. Director of Engineering, Technology and Regulatory at the engineering company ADTHEC (www.adthec.com.br), working in the areas of consultancy, planning, projects, training, research and solution analysis for radio, television and telecommunications stations from the public and private sector, with an emphasis on design and implementation of transmission systems. Participates in several working groups coordinated by Anatel, Ministry of Communications, Universities, Associations and Research Centers. The company is a member of the SBTVD Forum. Member of the deliberative council of SET (Society of Television Engineering), of the technical committee of AESP (Association of Radio and Television Broadcasters of the state of São Paulo)



Paulo Eduardo dos Reis Cardoso, Coordinator of Broadcasting Management Systems and Models, Anatel

PhD from DECOM-FEEC-Unicamp (2018) in Digital TV Regulation; Master in Electrical Engineering (Electronics) from DEMIC-FEEC-Unicamp (2005); and graduated in Electrical Engineering from FEEC-Unicamp (2002). He is currently a Regulation Specialist at the National Telecommunications Agency – Anatel, where he works as Coordinator of Broadcasting Management Systems and Models, in the Spectrum, Orbit and Broadcasting Management, being responsible for studying, improving and preparing the Broadcasting Technical Regulation, including its acts of technical and operational requirements; for monitoring the development of new broadcasting technologies and prospecting the future of broadcasting, including defining its needs; in addition to monitoring the development of the Mosaico System's broadcasting modules. He is leader of the Reporting Group GRR6: Broadcasting, of the Brazilian Communications Commission – CBC2: Radiocommunications, coordinating the group's international activities, including the coordination of broadcasting service stations in border areas; working mainly in Study Group 6 – SG6 of the International Telecommunications Union – ITU.

**ANTONIO MALVA NETO, Director of the Private Broadcasting Department, MCom**

Graduated in Law from UPIS - Faculdades Integradas, with a postgraduate degree in Public Law - Lato Sensu, with an extension in Higher Education Didactics. He worked in the Federal Chamber and the Federal Senate, always as a Parliamentary Advisor between 2016 and 2022. He participated in the management of Minister André Figueiredo at the Ministry of Communications, in 2016, as Advisor to His Excellency. He began his career in the Cabinet of Minister Marco Aurélio, at the Federal Supreme Court, in February 2000, remaining in the Cabinet until February 2011. He entered private law in 2011, remaining there to this day.

**Pierre Missud, CEO of Spectrum Center Inc.**

Pierre Missud is the CEO of Spectrum Center Inc. and the architect of the Spectrum-E software, which is the baseline for the Anatel Mosaico platform. With over 30 years of experience in spectrum management and engineering, Pierre has implemented numerous radio frequency (RF) propagation models and interference analysis standards for regulators and operators around the world. Pierre has a degree in engineering from AgroParis and a master's degree from UCC in L A and modeling techniques.

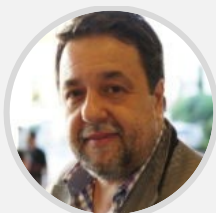
MPEG-H IN TV 3.0: FUTURE IMPLEMENTATIONS FOR BROADCAST TV AND STREAMING

TV 3.0 is expected to have its standard defined by December 2024. One of the key differentiators of this new standard will be immersive audio. In this context, Brazilian companies and broadcasters are preparing to implement the next-generation audio system for TV 3.0 in Brazil. MPEG-H audio technology aims to provide the best possible immersive sound experience while enabling advanced accessibility, interactivity, and personalization features in a single solution, taking audio to new heights. During the presentation, participants will discuss future technological developments in the country and how broadcasters and streaming platforms can enhance their viewers' experience with immersive sound.

Moderator: **Fernando Moura**, Chief Editor of SET Magazine

Speakers:

- **Renato Cesar Couto**, CTIO at Futura Produções
- **Gabriel Thomazini**, Audio Consultant - Fraunhofer IIS
- **Carlos Cosme**, Innovation specialist in the Telecom group of the Infrastructure and Security Hub, Globo
- **David Estevam de Britto Jr.**, Head of Product Development na Mirakulo Software LTDA



Fernando Moura, Chief Editor of SET Magazine

Fernando Carlos Moura has a PhD in Language and Communication Sciences with a specialty in Communication and Culture from Universidade Nova de Lisboa, Portugal. Editor-in-Chief of the SET Magazine since 2013 and post-doctoral fellow in the Studies Program Posdoctorales PEP-UNTREF, director of the Applied Research Program Project on Audiovisual Narratives in Times of Convergence Digital and Cultural at UNTREF and professor of the Degree in Audiovisual Production at the National University of Trés de Febrero (UNTREF), Buenos Aires, Argentina. Researcher associated with the Brazilian Digital Television Observatory (Obted).


Renato César Couto, CTIO at Futura Produções

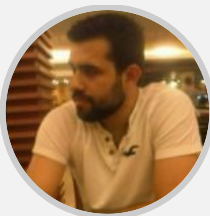
Renato César Couto is CTIO at Futura Produções, a company specialized in developing national streaming solutions, including OTT platforms, platforms for live events, transcoding and linear streaming. Graduated in Computer Science and Business Management, his trajectory has always been aligned with the latest technologies in business development and administration. With solid knowledge in several areas, such as Artificial Intelligence, Machine Learning, Cloud Computing, DevOps, Containerization and Microservices, Serverless Architecture, Blockchain and Progressive Web Applications, Renato always seeks to maximize resources and minimize costs. Currently, he works for major Futura Produções clients, playing a fundamental role in team management and project delivery. His professional journey is marked by a continuous search for updating and knowledge, which makes him a highly qualified professional committed to innovation and growth in the technology and streaming sector.


Gabriel Thomazini, Audio Consultant - Fraunhofer IIS

Gabriel Thomazini started his career as a recording engineer and went to different studios, working with artists from different genres. In the early 2000s he began designing audio systems and creating immersive content for planetariums. At the same time, he worked as an audio engineer in TV stations and since then he became increasingly involved in AV applications. He carried out projects in IP-based OB vans, studios, and control rooms, as well as the development of remote workflows and mixing for 3D audio formats. He collaborated on extended reality initiatives, developing audio solutions for VR and AR applications. After more than 20 years in the broadcast area he joined the Fraunhofer IIS Institute in 2021, where he acts as an audio consultant for the development of the MPEG-H audio ecosystem in Brazil.


Carlos Cosme, Innovation Specialist in the Telecom group of the Infrastructure and Security Hub, Globo

Carlos Eduardo Cosme Ribeiro has a degree in Electrical Engineering from Universidade Estácio de Sá (2007), a postgraduate degree in Control and Automation Engineering from Universidade Gama Filho (2011) and a specialist in Computer Networks from PUC Rio (2013). He has worked at Globo since 1998, where he worked in the operations and support areas. He is currently an innovation specialist in the Telecom group of the Infrastructure and Security Hub. He is a member of the Brazilian Terrestrial Digital TV System Forum (SBTVD), where he coordinates the Audio Coding, Video Coding and Subtitles working groups in the TV 3.0 Project.


David Estevam de Britto Jr, Head of Product Development at Mirakulo Software LTDA

David Estevam de Britto Junior is Head of Product Development at Mirakulo Software LTDA, a pioneering company in the development of Ginga middleware. Graduated in Electronic and Computer Engineering from UFRJ (Federal University of Rio de Janeiro), David began his career at Mirakulo developing systems for set-top boxes and TVs built on the Ginga standard, using the languages NCL, Lua, C/C++ , and Java. Since 2018, he has worked as development leader at Mirakulo, and has a great interest in using new technologies to enrich the experience of TV application users.

MOSAIC AS A TOOL FOR MANAGING THE FLOW OF BROADCASTING REQUESTS

Interference analysis, coverage analysis and licensing of broadcasting stations.

Moderator: Geraldo Cardoso de Melo, SET Regulatory Consultant

Speaker:

- **Paulo Eduardo dos Reis Cardoso**, Coordinator of Broadcasting Management Systems and Models, Anatel



Geraldo Cardoso de Melo, SET Regulatory Consultant

Geraldo Cardoso de Melo is a Telecommunications engineer with a degree and specialization from the Pontifical Catholic University of Minas Gerais (PUC-Minas). Consulting engineer in broadcasting services, Professor at PUC-Minas, member of the SET Spectrum Working Group and coordinator of SET Sudeste.



Paulo Eduardo dos Reis Cardoso, Coordinator of Broadcasting Management Systems and Models, Anatel

PhD from DECOM-FEEC-Unicamp (2018) in Digital TV Regulation; Master in Electrical Engineering (Electronics) from DEMIC-FEEC-Unicamp (2005); and graduated in Electrical Engineering from FEEC-Unicamp (2002). He is currently a Regulation Specialist at the National Telecommunications Agency – Anatel, where he works as Coordinator of Broadcasting Management Systems and Models, in the Spectrum, Orbit and Broadcasting Management, being responsible for studying, improving and preparing the Broadcasting Technical Regulation, including its acts of technical and operational requirements; for monitoring the development of new broadcasting technologies and prospecting the future of broadcasting, including defining its needs; in addition to monitoring the development of the Mosaico System's broadcasting modules. He is leader of the Reporting Group GRR6: Broadcasting, of the Brazilian Communications Commission – CBC2: Radiocommunications, coordinating the group's international activities, including the coordination of broadcasting service stations in border areas; working mainly in Study Group 6 – SG6 of the International Telecommunications Union – ITU.

CALL FOR PAPERS – SET INTERNATIONAL JOURNAL OF BROADCAST ENGINEERING (SET IJBE) – 1A. EDITION

This panel will highlight a selection of scientific papers submitted to the Call for Papers promoted annually by SET. The chosen studies will be published in the SET International Journal of Broadcast Engineering (SET IJBE), an international scientific journal dedicated to disseminating knowledge in communication engineering, especially in the areas of broadcast and new media. The SET IJBE aims to cover current research that represents the state of the art in these technologies.

Moderator: Cristiano Akamine, Researcher at the Digital TV Laboratory at Universidade Presbiteriana Mackenzie

Speakers:

COEXISTENCE OF GAP FILLER SYSTEM AND 5G IN OPTICAL NETWORK

Speaker: Ramon Maia Borges, Adjunct professor at UNIFEI. Single channel radiofrequency (RF) repeater systems, also known as “gap filler” and used for broadcasting, typically suffer from interfering wave (echo) at the repeater station. This work exploits a solution based on radio over fiber (RoF) to eliminate this problem and reports a coexistence analysis between gap filler system and the fifth-generation (5G) mobile communication in optical network. Experimental results show, after 25 km of fiber optic transmission, echo absence and modulation error ratio (MER) above 40 dB for the repeater system aimed for digital TV, as well as error vector magnitude (EVM_{RMS}) below the limits established for a 5G New Radio signal at 3.5 GHz. The obtained results illustrate the potential of taking advantage of existing optical infrastructure to deploy RoF-based gap filler systems, coexisting peacefully with other technologies.

FEATURES AND APPLICATIONS OF ATSC 3.0 TRANSMITTER IDENTIFICATION (TXID)

Speaker: Bo-mi Lim, Senior Researcher - ETRI (Electronics and Transmitter identification (TxID) is uniquely assigned to each transmitter to identify and control the transmitters in Advanced Television Systems Committee (ATSC) 3.0 broadcast networks, especially on a single frequency network (SFN). A transmitter also generates the TxID signal in addition to the ATSC 3.0 host signal but combines them, resulting in interfering with each other. This paper summarizes the TxID technique in ATSC 3.0 physical layer standard, including the detection performance, influences on the host ATSC 3.0 signal, and applications.

ROADS OF MIMO BROADCASTING: AN OVERVIEW OF VARIANT TECHNOLOGIES

Palestrant: Sung-Ik Park, Principal Researcher and Project Leader - ETRI (Electronics and Telecommunications Research Institute) - South Korea
This paper outlines ATSC 3.0 MIMO broadcasting technologies in terms of three variants: 1) Frequency Reuse-1 MIMO, 2) Backward-Compatible MIMO, and 3) Channel Bonding & MIMO. Through a brief discussion of their principles, features, and use cases, this paper sheds light on the diverse paths of MIMO broadcasting paved for the future of digital broadcasting systems. Furthermore, the paper discusses the implications and potential advancements of these technologies, emphasizing their role in achieving higher data rates and improved flexibility.

SYSTEM VERIFICATION OF ADVANCED ISDB-T

Speaker: Kohei Kambara, Senior Research at NHK STRL

Advanced ISDB-T is the next generation DTTB system recently developed in Japan. In this presentation, the feasibility and maturity of the system are shown with an introduction of End-to-end verification tests using experimental transmitter station.

AMPLIFYING IN-VEHICLE DTV ENTERTAINMENT: ATSC 3.0 BROADCAST SIGNAL RELAY VIA WIFI GATEWAY

Speaker: Sungjun Ahn, Senior Researcher - ETRI (Electronics and Telecommunications Research Institute)

This paper presents the relayed distribution of ATSC 3.0 broadcast signals to mobile users in moving vehicles. The gateway relay featured in this work seamlessly converts received ATSC 3.0 signals into a WiFi interface. This proposal exhibits the use of an ATSC 3.0-to-WiFi gateway to amplify broadcasting media in automotive, allowing personalized experience on individual seat positions.

ADVANCEMENTS IN DTT BROADCASTING SHOWCASING TV 2.5 AND TV 3.0 DURING THE FOOTBALL WORLD CUP 2022

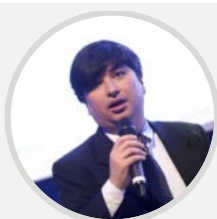
Speaker: Simone Ferrara, Senior Vice President of Technology and IP Strategy at V-Nova

A first showcase focuses on selected technologies adopted in TV 3.0, the next-generation TV broadcast standard set to be launched in Brazil from 2025, including

Versatile Video Coding (MPEG-I VVC), Low Complexity Enhancement Video Coding (MPEG-5 LCEVC) and MPEG-H Audio using Dynamic Adaptive Streaming over HTTP (DASH). These technologies were employed in an end-to-end live production, delivering 4K HDR video with immersive and personalized audio. The demonstration highlighted the rapid maturity of these technologies, implemented in both hardware and software solutions.

The TV 3.0 showcase, a collaboration between SBTVD Forum members and their partners, featured the first TV supporting VVC, LCEVC, and MPEG-H Audio, along with a user interface for interactive content and immersive sound experiences. This represents a significant step towards a better viewing experience, enabling the distribution of current and future formats, including 8K resolution, HDR, and Next-Generation Audio (NGA) through OTA and OTT streaming platforms.

The second showcase focused on the current TV 2.5 standard by adding backward-compatible technologies to serve legacy receivers while introducing new features for new receivers. The demo deployed for the first time MPEG-5 LCEVC to provide a live 1080p60 HDR enhanced channel starting from a legacy AVC 1080i30 SDR channel.



Cristiano Akamine, Researcher at the Digital TV Laboratory at Universidade Presbiteriana Mackenzie

He holds a degree in Electrical Engineering from Universidade Presbiteriana Mackenzie (1999), a master's degree and doctorate in Electrical Engineering from the State University of Campinas (2004/2011). He has been a researcher at the Digital TV Laboratory at Universidade Presbiteriana Mackenzie since 1998, completed an internship at the NHK Science and Technology Research Laboratories (STRL) and was a Visiting Specialist Professor at the Faculty of Technology at Unicamp. He is currently a professor in the Electrical Engineering course and the Postgraduate Program in Electrical and Computer Engineering (PPGEEC) at Universidade Presbiteriana Mackenzie and coordinator of the Digital TV Laboratory at Universidade Presbiteriana Mackenzie. He is a member of the deliberative council of the Brazilian Terrestrial Digital TV System Forum (SBTVD), Brazilian Society of Television Engineering (SET) and Associate Editor of IEEE Transactions on Broadcasting. He has several patents and several published articles and has experience in the area of Electrical Engineering, with an emphasis on digital TV, digital communication, channel coding, embedded systems, reconfigurable logic and software-defined radio.



Ramon Maia Borges, Adjunct Professor at UNIFEI

Ramon Maia Borges has a PhD in Electrical Engineering (2020) from the Federal University of Itajubá - UNIFEI, a Master's degree in Telecommunications (2015) and a degree in Electrical Engineering (2012) from the National Telecommunications Institute (Inatel). He worked as a researcher at Inatel linked to the Radiocommunications Reference Center and Optical-Wireless Convergence Laboratory between 2015 and 2021, the year in which he assumed the position of professor at the Institute. He is currently an adjunct professor at UNIFEI, working at the Institute of Systems Engineering and Information Technology. Its main research areas are: 5G networks, broadcasting, optical communications and microwave photonics.



Bo-mi Lim, Senior Researcher - ETRI (Electronics and Telecommunications Research Institute) Korea

Bo-mi Lim received her B.S. from Ajou University, Suwon, Republic of Korea, in 2008, and her M.S. from Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea, in 2010. Since 2010, she has been a member from the research team of the Media Research Division, Electronics and Telecommunications Research Institute. His research interests are in the areas of wireless communication systems design and digital transmission.



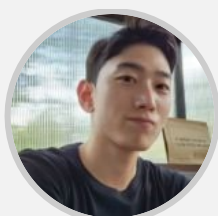
Sung-ik Park, Principal Researcher and Project Leader - ETRI (Electronics and Telecommunications Research Institute) - South Korea

Dr. Sung-ik Park (IEEE Fellow) joined the Broadcasting System Research Group of Electronics and Telecommunication Research Institute (ETRI) in 2002, and is responsible for terrestrial broadcast standardization, HW/SW implementations, and laboratory/field testing. Dr. Park is a principal investigator and leads several broadcast research projects. Dr. Park has more than 300 peer-reviewed journal and conference publications and multiple best paper and contribution awards for his work in broadcast technologies. Dr. Park currently serves as associate editor of IEEE Transactions on Broadcasting and ETRI Journal, and a distinguished speaker at the IEEE Broadcasting Technology Society.



Kohei Kambara, Senior Research at NHK STRL

Kohei Kambara joined NHK in 2001. Since 2019, he has worked for NHK STRL (Japan Broadcasting Corporation Science & Technology Research Laboratories). He is a senior research engineer in the Advanced Broadcast Systems Research Division and is involved in the development of next-generation terrestrial broadcast systems for UHD TV.



Sungjun Ahn, Senior Researcher - ETRI (Electronics and Telecommunications Research Institute)

Sungjun Ahn is a Senior Research Engineer at the Electronics and Telecommunications Research Institute (ETRI), contributing especially to the Media Research Division. His research group has led systems design, field verifications, standardization activities, and theoretical analyzes for ATSC 3.0 transmission and other wireless applications. He currently participates in research activities in the physical layer of ATSC 3.0 and 3GPP DTTs, with special interests in mobile media, interconnection between DTT and 5G, and DTT-related advancements for enhanced media distribution and beyond.



Simone Ferrara, Senior Vice President of Technology and IP Strategy at V-Nova

Simone Ferrara is the Senior Vice President of Technology and IP Strategy at V-Nova, with responsibility for technology, IP and standardization strategy, including enterprise-wide execution. Simone has been chair of the development committee for the latest MPEG standard, MPEG-5 Part 2 Low Complexity Enhancement Video Coding, and has contributed to many of the encoding tools included in the standard. Before joining V-Nova, Simone worked in the telecommunications industry, first as a researcher and then as Global IP Advisor for the Vodafone Group. He served as Board Member and Head of Education at the Chartered Institute of Patent Attorneys (CIPA). After

completing a Masters in Telecommunications Engineering at the Politecnico di Milano (Italy) and a Masters in Electrical Engineering at Washington University in St. Louis (USA), Simone subsequently qualified as a European and British patent attorney, and has used her experience to drive innovation and technological development in the video industry. Simone was awarded the "Talented Young Italians 2019 (Industry and Commerce)" award by the Italian Chamber of Commerce and Industry in the UK, in recognition of her outstanding contribution to the development of business between Italy and the UK.

Features and Applications of ATSC 3.0 Transmitter Identification (TxID)

Bo-mi Lim, Sunhyoung Kwon, Sungjun Ahn, Sung-Ik Park, and Namho Hur

Abstract—Transmitter identification (TxID) is uniquely assigned to each transmitter to identify and control the transmitters in Advanced Television Systems Committee (ATSC) 3.0 broadcast networks, especially on a single frequency network (SFN). A transmitter also generates the TxID signal in addition to the ATSC 3.0 host signal but combines them, resulting in interfering with each other. This paper summarizes the TxID technique in ATSC 3.0 physical layer standard, including the detection performance, influences on the host ATSC 3.0 signal, and applications.

Index Terms—ATSC 3.0, TxID, transmitter identification, SFN

I. INTRODUCTION

BY adopting orthogonal frequency division multiplexing (OFDM) for the second digital broadcast, the broadcasters can actively apply a single frequency network (SFN) under insufficient frequency bands. To construct a more efficient SFN, the Advanced Television Systems Committee (ATSC) 3.0 standard supports the centralized transmitter control system based on the broadcast gateway and transmitter identification (TxID) [1]–[3]. TxID is a unique value to identify each transmitter in the nationwide broadcast area. Also, transmitters generate TxID signals to differentiate signals from which transmitters come on the receiver side. This paper briefly introduces the TxID technique in ATSC 3.0 and considers the detection performance of the TxID signal in addition to applications.

II. TRANSMITTER IDENTIFICATION (TxID)

A. Features

TxID is a unique value between 0 to 8191 to identify the individual transmitter in ATSC 3.0 broadcast coverage areas. Therefore, a broadcast gateway controls the emission time, carrier offset, and the multiple input single input (MISO) filter of each transmitter in addition to passing common broadcast streams. Transmitters can generate the TxID signal depending on their own TxID values apart from the ATSC 3.0 signal, as shown in Fig. 1. As a result, the receiver can separate the received signals that appear as a superposition of transmit signals from multiple transmitters like multipath delayed fading channel and analyze their relative delays and amplitudes. The transmitter generates the unique binary Gold sequence with a length of 8192 depending on the assigned

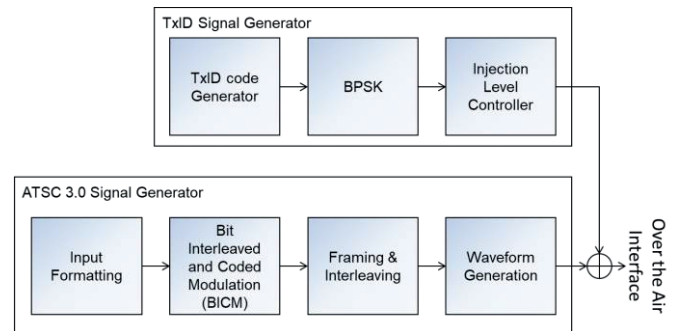


Fig. 1. Block diagram of ATSC 3.0 transmitter employing channel bonding.

TxID value and modulates the sequence as binary phase shift keying (BPSK). The modulated signal is time-synchronously injected on the first preamble symbol of the ATSC 3.0 host signal with 9 to 45 dB lower power. Therefore, two signals interfere with each other.

While the TxID is much lower than the ATSC 3.0 preamble signal, it can be detectable due to enough processing gain resulting from a direct sequence spread spectrum (DSSS) with an 8192 symbol length. The theoretical processing gain of the TxID signal is about 39 dB [4]. In addition, as the TxID signal is always aligned with the first preamble symbol, it is repeatedly injected according to the size of fast Fourier transform (FFT). For example, in the case of 32K FFT size, the TxID signal is continuously delivered four times. Therefore, the processing gain increases by 3 dB when the FFT size doubles. In [4], the authors dealt with the detection performance of the TxID signals and proposed the detection schemes. Since the TxID signal is the same over the transmission period, the detection performance may enhance after ensemble averages of receiver signals. Also, removing the preamble signal from the received signal significantly improves the reception performance.

The TxID signal also interferes with the ATSC 3.0 preamble signal. As the injection level gets larger, the TxID signal can be easily detected without an advanced detection algorithm, but the preamble deteriorates more. Therefore, there is a trade-off between the detection performance of the TxID signal and the preamble signal. In [5] and [6], the impact of the TxID signal on the preamble detection is considered both theoretically and practically with respect to the injection levels of the TxID signal and the protection modes of Layer 1 (L1) signaling data, L1-Basic and L1-Detail, conveyed in the preamble symbol. Protection modes

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1 and 2, generally used in ATSC 3.0 broadcasting system, are less influenced by the TxID signal. Therefore, the TxID signal might be provided all the time, not just when the broadcasters build their broadcast networks.

B. Applications

TxID signal enriches the broadcast service coverage, avoiding the deep nulls caused by multiple transmitting signals simultaneously arriving on the receiver side. In Seoul metropolitan areas [7], [8] and Jeju areas [9], the broadcasters examined the coverage areas with poor reception performance and enough signal strength based on the TxID signal analysis. By adjusting transmit time delays among transmitters, the reception performance might be improved. Even more, TxID signals enable channel modeling under a rich scattered fading environment [10]. By decoding TxID, the receiver can recognize which broadcast service areas it belongs to, so the broadcaster can provide the local service application like a geo-targeted advertisement.

III. CONCLUSION

This paper considered the TxID technique in the ATSC 3.0 physical layer standard. Though the TxID signal may interfere with the host ATSC 3.0 signal, it serves processing gain. It enables the broadcaster to manage the broadcast network in a centralized way, orchestrate transmitters, and provide localization services.

REFERENCES

- [1] ATSC Standard: A/322, Physical Layer Protocol, document A/322:2023, Advanced Television System Committee, Washington, DC, USA, March 2023.
- [2] ATSC Standard: A/324, Scheduler/Studio to Transmitter Link, document A/324:2023, Advanced Television System Committee, Washington, DC, USA, March 2023.
- [3] S.-I. Park *et al.*, "ATSC 3.0 Transmitter Identification Signals and Applications," *IEEE Trans. Broadcast.*, vol. 63, no. 1, pp. 240-249, March 2017.
- [4] S. Kwon *et al.*, "Detection Schemes for ATSC 3.0 Transmitter Identification in Single Frequency Network," *IEEE Trans. Broadcast.*, vol. 66, no. 2, pp. 229-240, June 2020.
- [5] B.-m. Lim *et al.*, "Laboratory Test Analysis of TxID Impact into ATSC 3.0 Preamble," *2018 IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, June 2018, pp. 1-3.
- [6] B.-m. Lim *et al.*, "Performance Evaluation of ATSC 3.0 Preamble for TxID Signal-Injected Use Cases," *2022 IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Bilbao, Spain, June 2022, pp. 1-5.
- [7] J. Lee *et al.*, "Transmitter Identification Signal Detection Algorithm for ATSC 3.0 Single Frequency Networks," *IEEE Trans. Broadcast.*, vol. 66, no. 3, pp. 737-743, Sep. 2020.
- [8] S. Jeon *et al.*, "Field Trial Results for ATSC 3.0 TxID Transmission and Detection in Single Frequency Network of Seoul," *2018 IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Valencia, Spain, 2018, pp. 1-4.
- [9] B. Lim *et al.*, "Field Evaluation of Transmit Diversity Code Filter Sets in ATSC 3.0 Single Frequency Networks," *IEEE Trans. Broadcast.*, vol. 68, no. 1, pp. 191-201, March 2022.
- [10] S. Ahn *et al.*, "Characterization and Modeling of UHF Wireless Channel in Terrestrial SFN Environments: Urban Fading Profiles," in *IEEE Transactions on Broadcasting*, vol. 68, no. 4, pp. 803-818, Dec. 2022.

Roads of MIMO Broadcasting: An Overview of Variant Technologies

Sung-Ik Park, *Fellow, IEEE*, Bo-mi Lim, *Member, IEEE*, Hoiyoon Jung, *Member, IEEE*, Namho Hur, *Member, IEEE*, and Sungjun Ahn, *Member, IEEE*

Abstract—This paper outlines futuristic ATSC 3.0 multiple-input multiple-output (MIMO) broadcasting technologies in terms of three variants: 1) Frequency reuse-1 MIMO, 2) Backward-compatible MIMO, and 3) Channel-bonded MIMO. Through a brief discussion of their principles, features, and use cases, this paper sheds light on the diverse paths of MIMO broadcasting paved for the future of digital broadcasting systems. Furthermore, the paper discusses the implications and potential advancements of these technologies, emphasizing their role in achieving higher data rates and improved flexibility.

Index Terms—MIMO broadcasting, ATSC 3.0, reuse-1 MIMO, backward compatible MIMO, channel bonding.

I. INTRODUCTION

LATELY, the actual services of the new digital terrestrial broadcasting standard, Advanced Television Systems Committee (ATSC) 3.0, have been commenced in several countries [1]. As a start-off for this new-generation broadcasting ecosystem, the launches in the United States and South Korea have departed from a generic single-input single-output (SISO) topology [2]. Since such baseline deployment has been brought into reality, pivoting from this milestone, the broadcast community is promptly preparing for the next step.

Distributing multiple-input multiple-output (MIMO) is recognized as one of the possible directions. The standard suite of ATSC 3.0 has already included MIMO operations and defined the concrete system chain [3]. This inclusion has primarily been for increased data capacity, where it doubles the transmission channel in a naïve sense. The ATSC 3.0 MIMO physically relies on cross-polarization, and stationary environments with well-pivoted directional antennas will be its primary target use case [4].

As mentioned, the first aim of building such MIMO technology has been at capacity doubling, which will bring more rich media quality or a diversified array of content [5]. However, the world is encountering greatly divergent local situations, which seek different values or are constrained differently by unique states of affairs. Such diversity, as a consequence, necessitates dedicated system evolutions into variant forms.

In this paper, we introduce the evolutions of MIMO broadcasting technology on the ATSC 3.0 basis, also

enlightening the particular need, use cases, and the background behind them. This report starts from a *reuse-1 MIMO*, which is currently a special interest of the Brazilian broadcasting community, and continues with *backward compatible (B-Comp) MIMO* and *channel-bonded (CB) MIMO* that have emerged from other contexts. Essential characteristics are discovered, leading to a comprehensive understanding of these technologies.

II. CURRENT STATUS OF ATSC 3.0 MIMO

Having the basic SISO-form ATSC 3.0 deployed in the real world, broadcasters have subsequently started preparing to bring ATSC 3.0 MIMO to the earth.

The broadcasters in South Korea are envisaging two possibilities for ATSC 3.0 MIMO: (i) A way more enriched ultra-high-definition (UHD) video service with 8K resolution [6], [7]; and (ii) an integral of multiple 4K UHD programs in the same frequency channel, where each program is from the different service provider. Principally, South Korea pursues high-quality and enriched videos more than other features. The latter imagination (ii) is conceived as appealing to the practitioners because it can create new business opportunities and stimulate the network operator's role.

III. EMERGING TECHNOLOGIES BASED ON ATSC 3.0 MIMO

A. Reuse-1 MIMO

Reuse-1 MIMO is a topology allowing the coexistence of plural, different, uncoordinated MIMO service signals in the same single radio frequency. Shortly speaking, multiple different service providers here share the same frequency channel [8], [9]. The powerful error protection capability of ATSC 3.0 enables this system, allowing the receiver to decode the desired signal successfully from a noisy mixture of plural MIMO service signals.

Brazilian broadcasting enablers are especially interested in this topology, particularly concerned with Brazil's spectrum circumstance. The new Brazilian broadcasting standard project, so-called *TV 3.0*, announced the mandate of reuse-1 operability on a MIMO basis.

This measure was to create additional data capacity while coping with an oversaturated spectrum issue. Brazil's radio spectrum dedicated to terrestrial broadcasting is devastatingly saturated since there are so many on-air programs ongoing simultaneously. To resolve this problem, Brazil is attempting

This work was supported by Institute of Information & Communications Technology Planning & Evaluation (IITP) grant funded by the Korea government (MSIT) (2022-0-00923, Development of Transceiver Technology for Terrestrial 8K Media Broadcast).

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to build a totally new, MIMO-based network foundation that would be not backward compatible.

The receiver at an arbitrary spot can tune to the desired service signal by pivoting the receive antenna properly, aligning it to the desired source's direction, cutting off the undesired signals by leaving them somewhere off the beam. Combined with the robust channel coding of ATSC 3.0, this assessment facilitates reuse-1 MIMO network even though many service providers are sharing the frequency, making the signal space crowded.

1) Single frequency network (SFN) with MIMO broadcasting

MIMO SFN could be considered a counterpart of reuse-1 MIMO, while single-frequency channel transmissions underlie both technologies. MIMO SFN lets clusters of towers transmit the same MIMO signal with centralized coordination, whereas the reuse-1 MIMO gives a mixture of different MIMO service signals.

B. B-Comp MIMO

The concept B-Comp MIMO has emerged from the countries that have already commenced ATSC 3.0 SISO services. This is considered a lubricating technology that assists a soft transition from SISO to MIMO ecosystem, or a spectrally efficient platform to embrace diverse target device-ends in the same frequency channel [10]-[13].

Specifically, B-Comp MIMO is a co-transmission of SISO and MIMO signals [10]. To this end, the physical layer multiplexing between them can rely on time division multiplexing (TDM) or layered division multiplexing (LDM). For example, B-Comp MIMO can harness the benefits of MIMO technology, serving dedicated MIMO terminals equipped with dual-polarized antennas, while serving SISO-based (physically constrained) mobile terminals and legacy television sets simultaneously in the same physical layer frame. As is designed, both types of end-terminals operate without any conflict.

C. CB MIMO

In terms of capacity amplification, CB MIMO goes one step further than the original ATSC 3.0 MIMO. CB MIMO utilizes two, consecutive or non-consecutive frequency channels along with leveraging cross-polarized MIMO technology at the same time [14]. This is, in essence, an integration of channel bonding and MIMO both defined in ATSC 3.0 physical layer.

By employing parallel transmission paths, ATSC 3.0-based CB MIMO is expected to provide up to about 200 Mbps data capacity.

IV. CONCLUSION

This paper introduced several variants of ATSC 3.0 MIMO to summarize the evolution of MIMO broadcasting technology. Reuse-1 MIMO, B-Comp MIMO, and CB MIMO were investigated, whose target markets deviate in different directions. For each technology, we exhibited the backgrounds and features. The implications and potential advancements of these technologies were discussed, emphasizing their role in achieving higher data rates and improved flexibility.

REFERENCES

- [1] S. Ahn *et al.*, "Characterization and modeling of UHF wireless channel in terrestrial SFN environments: Urban fading profiles," *IEEE Trans. Broadcast.*, vol. 68, no. 4, pp. 803-818, Dec. 2022.
- [2] S.-I. Park *et al.*, "Performance analysis of all modulation and code combinations in ATSC 3.0 physical layer protocol," *IEEE Trans. Broadcast.*, vol. 65, no. 2, pp. 197-210, Jun. 2019.
- [3] D. Gomez-Barquero *et al.*, "MIMO for ATSC 3.0," *IEEE Trans. Broadcast.*, vol. 62, no. 1, pp. 298-305, Mar. 2016.
- [4] E. Garro *et al.*, "Layered division multiplexing with co-located multiple-input multiple-output schemes," *IEEE Trans. Broadcast.*, vol. 66, no. 1, pp. 9-20, Mar. 2020.
- [5] S. Ahn *et al.*, "ATSC 3.0 for future broadcasting: Features and extensibility," *SET Int. J. Broadcast Eng.*, vol. 6, pp. 21-36, Dec. 2020.
- [6] H. Jung *et al.*, "Feasibility verification of ATSC 3.0 MIMO system for 8K-UHD terrestrial broadcasting," *IEEE Trans. Broadcast.*, vol. 67, no. 4, pp. 909-916, Dec. 2021.
- [7] S. Ahn *et al.*, "Converged distribution of 5G Media: Opportunities of overlaid broadcast and emerging applications over dual connectivity," *IEEE Trans. Broadcast.*, vol. 68, no. 2, pp. 501-516, Jun. 2022.
- [8] Y. Wu *et al.*, "Cloud transmission: A new spectrum reuse friendly digital terrestrial broadcasting transmission system," *IEEE Trans. Broadcast.*, vol. 58, no. 3, pp. 329-337, Sept. 2012.
- [9] J. Montalban *et al.*, "Cloud transmission: System performance and application scenarios," *IEEE Trans. Broadcast.*, vol. 60, no. 2, pp. 170-184, Jun. 2014.
- [10] J. Kang *et al.*, "Feasibility of backward compatible MIMO broadcasting: Issues in SISO-MIMO coexistence," *IEEE Trans. Broadcast.*, vol. 69, no. 2, pp. 589-609, Jun. 2023.
- [11] Y. Wu *et al.*, "Inter-tower communications network signal structure, and interference analysis for terrestrial broadcasting and datacasting," *IEEE Trans. Broadcast.*, vol. 69, no. 2, pp. 610-616, Jun. 2023.
- [12] Z. H. Hong *et al.*, "Implementation of wireless backhaul and inter-tower communications with MIMO in ATSC 3.0," *IEEE Trans. Broadcast.*, vol. 69, no. 2, pp. 579-588, Jun. 2023.
- [13] E. Iradier *et al.*, "Guest editorial special Issue on inter-tower communications and networks," *IEEE Trans. Broadcast.*, vol. 69, no. 2, pp. 553-559, Jun. 2023.
- [14] L. Stadelmeier *et al.*, "Channel bonding for ATSC 3.0," *IEEE Trans. Broadcast.*, vol. 62, no. 1, pp. 289-297, Mar. 2016.

System Verification of Advanced ISDB-T

Kohei Kambara

Abstract—The Advanced Integrated Services Digital Broadcasting-Terrestrial (Advanced ISDB-T) is a next generation digital terrestrial broadcasting system. From 2019, various experiments have been conducted and the fundamental performances were verified. In 2022, as for the total system verification test, the large-scale verification tests were conducted in 4 large cities in Japan. The verification test with using actual hardware including transmitter station showed the feasibility of the system.

Index Terms—Digital Terrestrial Broadcasting, Advanced ISDB-T,

I. INTRODUCTION

THE first-generation digital terrestrial television broadcasting using the Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) system [1] was launched in 2003 in Japan. Since then, ISDB-T system was adopted in 20 countries including Japan. More than 20 years have passed since ISDB-T system was developed, and during these years, there are various evolutions on broadcasting technologies. Ultra-high definition television (UHDTV) satellite broadcasting services using the Integrated Services Digital Broadcasting for Satellite, 3rd generation (ISDB-S3) system [2, 3] were launched in Japan in 2018, and UHDTV has become much popular recently.

II. ADVANCED ISDB-T SYSTEM

In order to improve the user experience and for the efficient use of terrestrial broadcasting frequency band, we are currently developing the advanced terrestrial broadcasting system for the next generation of digital terrestrial television broadcasting. For the physical layer we have developed the transmitting system Advanced Integrated Services Digital Broadcasting-Terrestrial (Advanced ISDB-T) [4, 5]. With inheriting the features of ISDB-T such as hierarchical transmission and partial reception and so on, Advanced ISDB-T has improved the transmitting performance and functions. With utilizing the latest technologies, Advanced ISDB-T improved the capacity for 1.7 times larger than ISDB-T. The main key for improving the capacity was the adoption of low-density parity-check (LDPC) codes [6] and non-uniform constellations (NUC) [7]. Availability of larger FFT size such as 16k and 32k, or higher carrier modulation such as 256QAM, 1024QAM, 4096QAM and, the expanded signal bandwidth from 5.57 MHz to 5.83 MHz have also contributed to the increasement of the capacity.

The research and development for the next generation digital terrestrial broadcasting was not only limited to the

physical layer. We have also conducted the research and development of transport layer and video/audio coding. The internet protocol (IP) based transport layer was intended to realize high level harmonization between broadcast and broadband. The system enables provision of integrated broadcast and broadband services, such as multi-view video, content replacement and augmented reality (AR)/virtual reality (VR) in TV programs. To verify the integrated broadcast and broadband services, we have developed an all-IP software-based integrated master control system that outputs signals to transmission stations and broadband networks. For the video coding, the system adopted Versatile Video Coding (VVC) which is the latest video coding standard that enables high efficiency and multiple functions. For the audio coding the system utilized Moving Picture Expert Group (MPEG)-H 3D Audio (3DA).

III. TOTAL VERIFICATION TESTS

From 2019 to 2022, The experimental transmitter stations are constructed in 4 large cities in Japan and various transmitting experiments were conducted. To verify the system in total, we have conducted the end-to-end verification test with using actual equipment including the experimental transmitter stations in 2022. Fig.1 shows the block diagram of the verification test. Fig.2 shows the equipment of the receiving site. With using the hierarchical transmission, two UHDTV services for fixed reception and two HDTV services for mobile reception within 6-MHz bandwidth of UHF band was demonstrated. The video and audio content were encoded/decoded with VVC and MPEG-H 3DA real-time encoder/decoder. The integrated broadcast and broadband services were also verified with using a signal via a broadcast and broadband network.

IV. CONCLUSION

The end-to-end verification test using actual equipment of the Advanced ISDB-T was conducted in for large cities in Japan. The test was successfully done which shows the feasibility of the Advanced ISDB-T system in total.

ACKNOWLEDGMENT

Part of this research was conducted under a contract from the Association for Promotion of Advanced Broadcasting Services (A-PAB) as part of its project commissioned by the Technical Examination Services Concerning Frequency Crowding of the Ministry of Internal Affairs and Communications, titled “Survey and Studies on Technical Measures for Effective Use of Broadcasting Frequencies (Survey and Studies for New Broadcasting Services).”

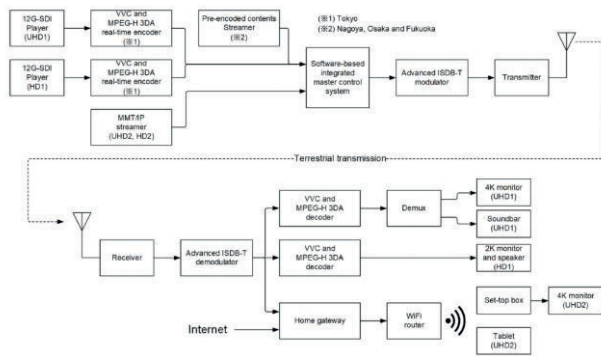


Fig. 1. Block diagram of the total verification test



Fig. 2. Equipment of the receiver site

REFERENCES

- [1] ARIB standard: "Transmission system for digital terrestrial television broadcasting," ARIB STD-B31 Version 2.2 (Mar. 2014)
- [2] ARIB standard: "Transmission system for advanced wide band digital satellite broadcasting," ARIB STD-B44 Version 2.0 (Jul.2014)
- [3] Recommendation ITU-R: "Transmission system for UHDTV satellite broadcasting," BO.2098-0 (Dec. 2016)
- [4] M. Nakamura et al.: "A study on the transmission system for an advanced ISDB-T," in *Proc. 14th IEEE Int. Symp. on BMSB*, 4A-2 (Jun. 2019)
- [5] N. Shirai et al.: "Laboratory experiments and large-scale field trials for evaluating the advanced ISDB-T," in *Proc. 14th IEEE Int. Symp. on BMSB*, 4A-4 (Jun. 2019)
- [6] S. Asakura et al.: "FPGA-based performance evaluation of FEC codes for an Advanced ISDB-T," *ITE Trans. MTA*, 9, 3, pp. 180-187 (Jul. 2020)
- [7] S. Asakura et al.: "Transmission performance evaluation of an Advanced ISDB-T -Non-uniform constellation performance in an echo channel-," *ITE Tech. Rep.*, 44, 16, pp. 21-24 (Jul. 2020), in Japanese



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Amplifying In-Vehicle DTV Entertainment: ATSC 3.0 Broadcast Signal Relay via WiFi Gateway

Sungjun Ahn, *Member, IEEE*, Yongsuk Kim, and Sung-Ik Park, *Fellow, IEEE*

Abstract—This paper presents the relayed distribution of ATSC 3.0 broadcast signals to mobile users in moving vehicles. The gateway relay featured in this work seamlessly converts received ATSC 3.0 signals into a WiFi interface. This proposal exhibits the use of an ATSC 3.0-to-WiFi gateway to amplify broadcasting media in automotive, allowing personalized experience on individual seat positions.

Index Terms—ATSC 3.0, in-vehicle entertainment, mobile broadcasting, ATSC 3.0-to-WiFi gateway.

I. INTRODUCTION

IN recent years, the demand for in-vehicle entertainment and connectivity has surged, fueled by the rising prevalence of self-driving technology and the ubiquitous consumption of digital media on mobile devices [1]. The community's approach, as a response, has first focused on developing technologies that facilitate direct-to-vehicle (D2V) content delivery [2], [3]. The major concern in this development has been building sufficient reliability to cope with dynamic channel situations. Notably, the use of multi-antenna diversity [4] and broadcast-broadband cooperation based on dual connectivity [5] have been proposed as solutions.

Within dynamic automotive environments, it is known as quite demanding to serve rich video content to every passenger [6]. Considering the cellular networks these days, various physical obstacles and traffic problems incur frequent streaming interruptions [7]. Moreover, from the user's view, it is also demanding to rely on paid data channels for streaming huge amounts of video data during a long journey on the road [8]. Advanced Television Systems Committee (ATSC) has long remarked on such issues and has made careful efforts to support vehicle broadcasting from the very first stage of developing a new standard, ATSC 3.0 [9], [1]. The broadcasting-based solutions such as [4] have hence been highlighted for this use case.

In fact, specific ideas to serve each individual passenger's device have been less identified so far. Such sort of detail has been recognized as the next step after building the D2V connectivity. Nonetheless, since the D2V supply is actually being embodied in the real world [4], it is no more a future work to hold off. This paper, in this context, introduces a

feasible solution to build a bridge from air ATSC 3.0 signals to the end devices inside a vehicle.

Particularly, this is a showcasing of a WiFi gateway operating as an ATSC 3.0 relay with interface conversion ability. The presented gateway system seamlessly captures the received broadcast signals and converts them into a format compatible with WiFi-enabled devices, ensuring a smooth and uninterrupted streaming experience. Accordingly, the individual users at the seat are allowed to enjoy content on their own personalized displays in convenient positions. This paper presents the architecture design of the ATSC 3.0-to-WiFi gateway and its actual use in automotive systems. With the advent of this gateway system, the momentum of D2V broadcasting will be amplified, as it allows passengers to access a diverse array of ATSC 3.0 broadcast content on their personalized devices and displays while on the move.

II. DESIGN AND THE USE FOR MOBILE BROADCASTING

Fig. 1 illustrates the concept of the ATSC 3.0-to-WiFi gateway. This system forwards the content in broadcasted airwaves to the local access users in a car interior. The physical layer conveyor is converted from ATSC 3.0 broadcasting to WiFi unicasting during then.

This solution tackles three relevant problems that arise when direct-to-mobile (D2M) serves the passengers: (i) Physical penetration loss, (ii) mobile environment distortion, and (iii) compatibility with ready-distributed legacy devices. The decode-and-forward procedure of this system allows the users to avoid penetration loss; multi-antenna diversity, enabled by spacious car top, alleviates the mobile distortions if deployed. Most notably, WiFi transmission at the end link will allow the legacy smartphones, yet not supporting ATSC 3.0 D2M, to access the ATSC 3.0-conveyed contents.

The implementation can follow a structure described in Fig. 2. Fig. 2 is a particular example that employs four receive antennas and provides opportunities to access four different broadcast channels, namely, a 4-by-4 configuration. Simply speaking, the presented system consists of ATSC 3.0 demodulators and a WiFi access point (AP), which includes a data scheduler and transceiver. The ATSC 3.0 airwaves in the target frequency are first captured by a dedicated tuner, and decoded by the ATSC 3.0 demodulator. The ATSC 3.0 demodulator module feeds ATSC link-layer protocol (ALP)

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This paper addressed the challenge of delivering ATSC 3.0 broadcast signals to mobile users within a moving vehicle, leveraging the concept of a gateway system that converts these signals into a WiFi interface. The presented gateway system is a compact solution to provide terrestrial broadcast content to personal mobile devices, acting as a bridge between the ATSC 3.0 over the air and the WiFi network within the vehicle. Penetration loss, cabling burden, and position-dependent accessibility problems are hence resolved, thereby offering an enjoyable media experience condition. With the assistance of this vehicle gateway system, digital terrestrial broadcasting will be pleasantly embraced into infotainment systems in automotive, and would subsequently propel the expansion of D2V opportunities beyond media entertainment.

REFERENCES

- [1] S. Ahn *et al.*, "Mobile performance evaluation for ATSC 3.0 physical layer modulation and code combinations under TU-6 channel," *IEEE Trans. Broadcast.*, vol. 66, no. 4, pp. 770-785, Dec. 2020.
- [2] L. Zhang *et al.*, "Using layered-division-multiplexing to deliver multi-layer mobile services in ATSC 3.0," *IEEE Trans. Broadcast.*, vol. 65, no. 1, pp. 40-52, Mar. 2019.
- [3] C. Reguerio *et al.*, "LDM core services performance in ATSC 3.0," *IEEE Trans. Broadcast.*, vol. 62, no. 1, pp. 244-252, Mar. 2016.
- [4] S. Ahn *et al.*, "Multi-antenna diversity gain in terrestrial broadcasting receivers on vehicles: A coverage probability perspective," *ETRI Journal*, 2021.
- [5] S. Ahn *et al.*, "Cooperation between LDM-based terrestrial broadcast and broadband unicast: On scalable video streaming applications," *IEEE Trans. Broadcast.*, vol. 67, no. 1, pp. 2-22, Mar. 2021.
- [6] J. Lee *et al.*, "IP-based cooperative services using ATSC 3.0 broadcast and broadband," *IEEE Trans. Broadcast.*, vol. 66, no. 2, pp. 440-448, Jun. 2020.
- [7] S.-K. Ahn *et al.*, "Evaluation of ATSC 3.0 and 3GPP Rel-17 5G broadcasting systems for mobile handheld applications," *IEEE Trans. Broadcast.*, vol. 69, no. 2, pp. 338-356, Jun. 2023.
- [8] S. Ahn *et al.*, "Converged distribution of 5G Media: Opportunities of overlaid broadcast and emerging applications over dual connectivity," *IEEE Trans. Broadcast.*, vol. 68, no. 2, pp. 501-516, Jun. 2022.
- [9] L. Fay *et al.*, "An overview of the ATSC 3.0 physical layer specification," *IEEE Trans. Broadcast.*, vol. 62, no. 1, pp. 159-171, Mar. 2016.

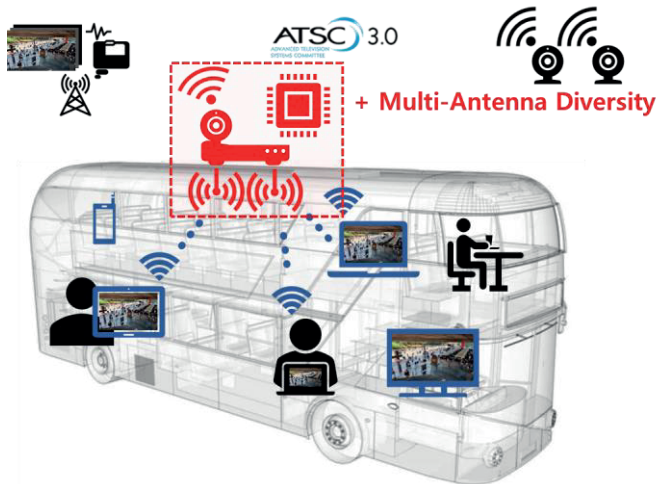


Fig. 1. Conceptual description of the ATSC 3.0-to-WiFi gateway mounted on vehicle: Mass transportation case.

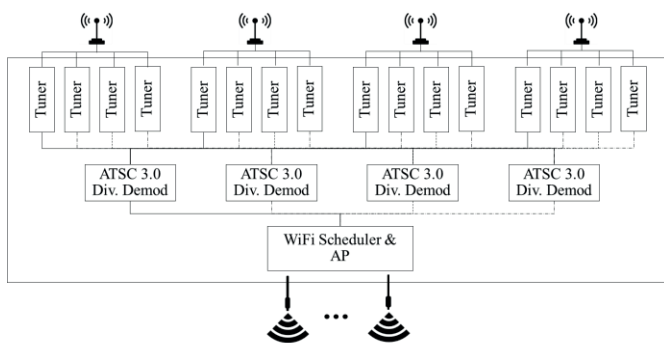


Fig. 2. System structure of the ATSC 3.0-to-WiFi gateway.

packets, which are Internet Protocol (IP)-based, to the WiFi AP. The WiFi AP at the end stage controls every access from each passenger device and forwards the received ALP packets responding to the requests. Delivered the content to the passenger device, the service content is then source-decoded by a dedicated app program, finally being presented on display.

The 4-by-4 or 4-by-2 cases would be reasonable examples if private cars are on the table. Many such personal motors have four seats where the display sets can be embedded. Therefore, accessibility to four different channels will give every user the authority to choose the channel to watch. 4-by-2, on the other hand, will give such an opportunity to the front and back seats. However, if a packed mass-transportation vehicle is considered, the mechanism for controlling the desired channel shall be differently made. For example, some *master users*, N users in an N_T -by- N case, can be selected, and the set of *watchable channels* is then determined by them, letting the other users consume one in this set.

Simultaneously, multi-antennas installed on the rooftop offer diversity gain to combat mobility-caused distortions. The diversity reception improves the effective signal power and also allows to cope with local shadowing issues dynamically. This advantage possibly propels the D2V broadcasting itself, boosting media entertainment in mobile environments.

The benefits extend beyond entertainment alone. The gateway system also opens up possibilities for educational content delivery, emergency broadcasts, and location-specific information dissemination to enhance the overall in-vehicle experience.

CALL FOR PAPERS – SET INTERNATIONAL JOURNAL OF BROADCAST ENGINEERING (SET IJBE) – 2ND EDITION

This panel highlights a selection of scientific works submitted to the Call for Papers promoted annually by SET. The chosen studies will be published in the SET International Journal of Broadcast Engineering (SET IJBE), an international scientific journal dedicated to the dissemination of knowledge in communications engineering, especially in the areas of broadcast and new media. SET IJBE aims to encompass current research that represents the state of the art in these technologies.

Moderator: **João Vандoros**, Consultant

Speakers:

A LARGER SCOPE OF CMAF USAGE FOR VIDEO DELIVERY

Speaker: Robin Hérin, Senior Innovation and Technologies Engineer at Ateme
The emergence of the CMAF file format transformed OTT video delivery with its versatile, ISO BMFF-based architecture, surpassing rival formats in interoperability. Initially, CMAF was utilized for B2C packaging (end-users and players). However, with the advent of the live media ingest protocol, it is set to dominate the B2B video delivery scope. This protocol enables seamless video exchange between various video processing entities (encoders, packagers, CDN, cloud services) through synchronized data and metadata fragments from the original stream. The technology gains immense interest as it offers a modern alternative to the traditional TS format for first mile delivery. The paper covers the protocol's key features, benefits, and implementation architecture.

AN OVERVIEW OF AUDIO TECHNOLOGIES, IMMERSION AND PERSONALIZATION FEATURES ENVISAGED FOR THE TV3.0

Speaker: Regis Rossi A.Faria, School of Arts, Sciences and Humanities - University of São Paulo

Co-speaker: Almir Almas, School of Communications and Arts - University of São Paulo

In 2021 the Forum SBTVD accomplished the phase 2 of the TV3.0 project, comprised of a series of tests of the technologies proposed for this next generation of TVD system in Brazil. The tests were conducted by research groups of Brazilian universities. Particularly referring to the audio coding layer of the system, we carried out at the University of São Paulo 13 groups of tests, as prescribed in a public Call, and could assess the technologies capabilities and versatility in providing a series of new features for next generation of audio in the digital broadcasting system. This paper summarizes the main results of this testing and evaluation phase, and brings an overview of the stimulating new features that content producers and audience would have available to create and consume immersive and personalized services at home.

HARMONIZED SUPPORT FOR IMMERSIVE AUDIO INTERACTIVITY IN SBTVD TV 2.5 AND TV 3.0

Speaker: Marcelo F. Moreno, Associate Professor, Federal University of Juiz de Fora (UFJF)

Co-speaker: Adrian Murtaza, Senior Manager, Technology and Standards - Fraunhofer IIS

MPEG-H Audio enables highly efficient immersive audio transmission with advanced accessibility, interaction, personalization, and adaptation features. MPEG-H Audio utilizes audio objects and metadata to allow viewers to interact with content, creating a personalized listening experience. Broadcasters can enable or disable interactivity options and set limits for viewer interactions. This paper details Fraunhofer IIS' proposal for TV 3.0 Project on new high-level immersive audio interactivity APIs for Ginga-NCL and Ginga CC WebServices. These APIs allow broadcasters to develop and deliver multimedia applications to control such advanced audio features, using their own visual identity, graphical design and even the multimodal interaction expected to be supported in TV 3.0. The paper also discusses the implications of audio stream metadata changes, which occurs when the content includes different audio scenes. The work highlights that such API proposal for TV 3.0 is harmonized with current TV 2.5 specifications and, given the increasing number of TV 2.5 receivers supporting MPEG-H audio, these APIs could also be proposed for being included in current standards.

ACADEMIA'S R&D PROGRESS ON TV 3.0 APPLICATION CODING

Speaker: Marcelo F. Moreno, Associate Professor, Federal University of Juiz de Fora (UFJF)

SBTVD Forum's TV 3.0 Project aims to develop the next-generation broadcasting technologies for Brazil. Television has played a crucial social and cultural role in the country, and any technological evolution could lead to significant societal changes. Currently in Phase 3, the project carries out an R&D effort on application coding support, gathering 40 researchers from Academia. This paper focuses on the methodology, progress and early achievements of the Academia R&D team on addressing the high-priority application-coding requirements for TV 3.0. Focus groups

and opinion polls have been contributing to social studies related to the application-based TV experience. The group proposes architectural changes, new user interfaces and a persistent media player for enhanced interactivity and full broadcaster control over all audiovisual content. Moreover, efforts are made to evaluate audio and video codecs, including the adopted MPEG-H audio technology, to identify the need for new APIs in a harmonized fashion with current SBTVD standards. The team also focuses on extensibility support and accessibility requirements, particularly on forwarding captioning and sign language to mobile devices. Work is in progress for sensory effects, immersive content, and multimodal interaction, utilizing the adopted NCL 4.0 and Guaraná proposals to enable advanced mulsemmedia applications and 360° scenes. A demonstration of TV 3.0 use case prototypes will take place during SET Expo 2023 to showcase and discuss the progress and the findings of the Academia R&D team.

THE USE OF ARTIFICIAL INTELLIGENCE ENABLING SCALABLE AUDIO DESCRIPTION ON BRAZILIAN TELEVISION: A WORKFLOW PROPOSAL

Speaker: Luiz Kruszielski, Audio Producer - Globo

Recently, Artificial Intelligence (AI) technologies have been gaining ground in various areas of knowledge, significantly impacting many academic and business spheres. One application that can benefit from AI is the inclusion of people with disabilities in audiovisual content, where the scaling capacity of certain processes can bring new accessibility opportunities. In this work, we show what a traditional workflow of an audio description for dramaturgy audiovisual content looks like, and from there, we propose a new workflow for generating audio description audios for visually impaired people using synthetic voice created with Artificial Intelligence models. The proposed workflow simplifies and considerably reduces production time and costs, besides allowing the generation of audios on a larger scale compared to a traditional workflow, enabling a broader reach of the target audience. It also allows multiple people to work simultaneously on the same project while preserving sound identity through the synthetic voice and standardized mixing. With this proposal, we believe that accessibility on Brazilian television can be expanded to serve a much larger audience.

GLOBO'S ULTIMATE OPERATIONAL CHALLENGE: A CREATIVE FULL BASED WORKFLOW EDITING IN CLOUD

Speaker: Priscila David, Product Owner of Post-Production projects in Globo's Media Solutions area

Co-speaker: Ariza Bertelli, Media Solutions Analyst, Globo
In 2022, the famous and epic soap opera “Chocolate com Pimenta” in Brazil became a good surprise for TV Globo: the post-production chain accomplished a simple, productive, and economical workflow. A cloud based, remote and collaborative editing produced the entertainment content in an innovative way. Globo, a free-to-air television network, saw in this path an excellent opportunity to thrive technologically and to offer spectators a unique experience. Globo's objective was to provide a special

edition of the soap opera through Globoplay, an online video on demand platform, and by Open TV. Having the team in charge located at Post-Production Center of Estúdios Globo, the material was edited collaboratively in HD (XDCAM codec) directly connected to cloud. The process was successfully achieved and has helped to maintain Globo into the future of technological innovations. And besides, the business model of this unique approach was very attractive for Globo, solving the market need for a cloud-native solution, notably when the Post-Production Center deals with big files and assets routinely, enabling the increase of the content production to a next level (cost benefit). Globo interprets this initiative not as a mere technological advance, but also as a step taken toward a more concrete operational level. Through all the effortful work, Globo, its customers, and everybody involved in this project could come together to cheer and look forward for a brand-new efficient future.

TOOL IN PYTHON FOR PREDICTING WIRELESS NETWORK SIGNALS IN AN INDOOR ENVIRONMENT USING NEURAL NETWORKS BASED ON MAPPING AND MEASUREMENTS IN THE FIELD

Speaker: Breno Batista Nascimento Silva, Undergraduate student - Faculty of Electrical Engineering - Mackenzie University

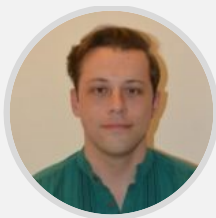
This work aims to present the advances and applications of Artificial Neural Networks (ANNs) using the Python programming language. ANNs have proven to be a powerful tool in the field of artificial intelligence, imitating the functioning of the human brain to solve complex problems and perform tasks that previously required extremely elaborate algorithms.

In addition, the importance of Python as one of the most popular and accessible languages for the development of neural networks will be emphasized. Through robust libraries, it is possible to create, train and evaluate neural networks efficiently and intuitively.



João Vандoros, Consultant

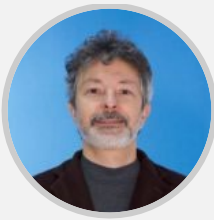
Joao Vандoros, graduated in Electrical Engineering from Universidade Presbiteriana Mackenzie and Specialist in Telecommunications from the University of Campinas, has worked in the video distribution and contribution market since 2000, where he began his career at Mackenzie's Digital TV Laboratory. having worked at the companies TVA and Band between 2006 and 2013. Since 2013 as a consultant, he has worked on several projects, with emphasis on those carried out at GfK, Eurovision and Mackenzie - where he currently cooperates in evaluating the physical layer for TV 3.0 through RNP.



Robin Hérin, Senior Innovation and Technologies Engineer at Ateame

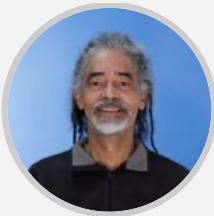
Robin Hérin is a Senior Innovation and Technologies Engineer in the Office of the CTO at Ateame, where he helps the Research and Innovation team develop future technologies for video processing and delivery, as well as leading partnership and standardization projects. Now in his eighth year at Ateame and in his career, Robin previously worked as a Solutions Architect in both South and North America before moving to New York and focusing on expanding Ateame's presence in the Northeast. U.S. Robin holds a master's

degree in mechanical engineering from the Université de Technologie de Compiègne in France.



Regis Rossi A. Faria, School of Arts, Sciences and Humanities - University of São Paulo

Regis Rossi Alves Faria is a professor at the School of Arts, Sciences and Humanities and the School of Communications and Arts at the University of São Paulo. He works in the interdisciplinarity between arts and sciences, in the areas of audio engineering, sound computing and music, addressing issues related to the creation and reception of sound using technological resources, and developing systems for sound and music. He coordinates the Audio and Music Technology Laboratory at USP (LATM-EACH/USP), is a researcher at LabArteMídia (ECA/USP) and at the Sonological Research Center (ECA/USP). He is a member of the ABNT Audio, Image, Multimedia and Hypermedia Coding Study Committee and is an audio specialist representing the Brazilian Association of Technical Standards at ISO-MPEG.



Almir Almas, School of Communications and Arts - University of São Paulo

Associate Professor at the Department of Cinema, Radio and Television and researcher the Postgraduate Program in Media and Audiovisual Processes; General Coordinator of the LabArteMídia Research Group and the Obtd Observatory at ECA/University of São Paulo. PhD in Communication and Semiotics. Filmmaker/Video Artist/VJ; Artist of the Cabaia Art Collective. Member of the Board of Directors of the Brazilian Society of Television Engineering (SET). Member of the Brazilian Forum of the Brazilian Digital Terrestrial Television System (FORUM SBTVD). Author of the book "Digital terrestrial television: systems, standards and models", among other books and articles.



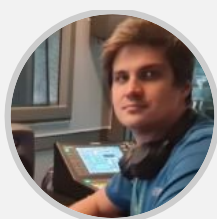
Marcelo F. Moreno, Associate Professor, Federal University of Juiz de Fora (UFJF)

Visiting Researcher at the International Audio Laboratories Erlangen, the Institute for Integrated Circuits of the Fraunhofer Society (Fraunhofer IIS) and the Friedrich-Alexander-Universität (FAU), Germany. He has been an associate professor at the Department of Computer Science at the Federal University of Juiz de Fora (UFJF) since 2011. He holds a master's degree (2002) and a doctorate (2008) in Information Technology from PUC-Rio. He has worked on national and international research, technology transfer and standardization projects in Digital TV, IPTV and multimedia since 2004. Since 2013, he has been leader of Question 13/16 "Multimedia application platforms and end systems for IPTV" of the International Union of Telecommunications (ITU-T), where he also co-leads the groups WP1/16 "Infrastructure for Multimedia Systems" and TG – Media Coding, in "Immersive Media Coding for metaverse applications and services" (in the Focus Group in the ITU-T metaverse). Since 2015, he has been coordinator of the Middleware GT of the SBTVD Forum, leading efforts to standardize DTVPlay, the development of its test suite and its evolution towards TV 3.0. He is a productivity fellow in technological development from CNPq (DT-2).



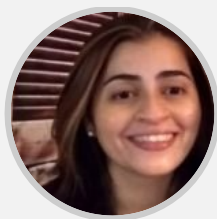
Adrian Murtaza, Senior Manager, Technology and Standards - Fraunhofer IIS

Adrian Murtaza received his master's degree in Communication Systems from the École Polytechnique Fédérale de Lausanne, Switzerland in 2012 with a thesis on "Backward Compatible Smart and Interactive Audio Transmission". After graduation, he joined Fraunhofer IIS, where he works as a Senior Research Engineer. Adrian Murtaza joined MPEG in 2013 and has since contributed to the development of several technical audio standards in MPEG-D and MPEG-H. He serves as Senior Standards Manager for Fraunhofer at several industry standards bodies, including DVB, ATSC, SBTVD, CTA and SCTE, and has co-authored several specifications within these groups. Most recently, he has focused on specifying next-generation audio delivery and transport in ATSC 3.0 systems and MPEG-2 transport stream-based DVB systems, as well as enabling MPEG-H audio services in different broadcast ecosystems and streaming.



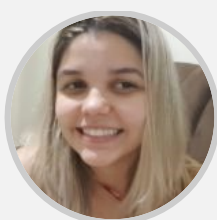
Luiz Kruszielski, Audio Producer - Globo

Luiz Fernando Kruszielski graduated in Sound Production (UFPR - Brazil) and has a master's and doctorate in Sound and Environment from the Tokyo University of Arts (Japan). He has worked as a professional sound designer since 2003 and, from 2013, he started working at Rede Globo as a sound technology researcher, later becoming Sound Producer, where he worked in more than 10 series and soap operas.



Priscila David, Product Owner of Post-Production projects in the Media Solutions area at Globo

Priscila David was born in Rio de Janeiro, Brazil, in 1989. Graduated in Telecommunications Engineering, she has an MBA in Strategic People Management. She was the author of the Poster "4K and 4K-HDR VOD at the Rio 2016 Olympic Games" published by IBC in 2017. She has worked at Globo for 17 years. For the last two years, he has been Product Owner of Post-Production projects in Globo's Media Solutions area.



Ariza Bertelli, Media Solutions Analyst, Globo

Ariza Bertelli was born in Minas Gerais, Brazil, in 2000. She is majoring in Electrical Engineering with an emphasis on Robotics and Industrial Automation. She was a member of the IEEE from 2019 to 2021. She received the award for the 3rd best educational project from RNR: "Falando com as más" in 2020. She had been at Globo for 1 year as a media solutions intern and, in June 2023, as an Analyst of Media Solutions.



Breno Batista Nascimento Silva, Undergraduate student - Faculty of Electrical Engineering - Mackenzie University

Electricity has always been a passion, so much so that at the age of 15 he enrolled in a technical electronics course at Senai Guarulhos, where he decided which college he would pursue. In 2019, joined at the Faculty of Electrical Engineering, through a Mackenzie philanthropic scholarship, where he found several opportunities for personal and professional development. It was during a class during the pandemic that he became interested in the opportunity to carry out a scientific initiation with Professor

Edson Tafeli on Artificial Neural Networks (ANNs) in Python. He currently works as an Accounting Measurement Analyst at the Energy Trading Chamber (CCEE).

R&D Progress on TV 3.0 Application Coding Layer

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Abstract—This paper outlines the methodology, progress, and initial outcomes of a collaborative R&D effort by 40 researchers from six academic institutions, focused on addressing critical application-coding requirements for SBTVD Forum's TV 3.0 Project, Phase 3. The team is developing prototypes and use cases applications to validate and demonstrate TV 3.0 application coding features. Key developments include architectural changes, a persistent media player, a viewer's journey design, besides extensive research in requirements engineering, user data analysis, and novel codec support. The team also explored application coding extensibility, enhanced accessibility, immersive experiences and multimodal interaction. During SET Expo 2023, partial implementations of the prototyped use cases were showcased, highlighting the project's progress and significance. This paper provides technical details and diagrams, facilitating a thorough discussion of this innovative project.

Index Terms—Application coding, TV 3.0, Application-based TV experience, Personalized TV experience, Immersive TV experience, accessibility.

I. INTRODUCTION

Television plays a social role of immense relevance in Brazil. TV is more than a technological object in the room: it is also an important cultural artifact and an element of national integration. Therefore, any technological evolution that represents a change in the way of watching television may imply some cultural change for the society itself. Thus, the development process of SBTVD Forum's TV 3.0 Project [1], at least for its most highlighted application coding use cases and features, are being carried out not only as a technology research, but also as a social study.

Brazil has been watching TV since 1950, with the inauguration of TV Tupi in São Paulo. In seven decades, Brazilian television has experienced technological, social and content development that makes the national experience one of the richest in the world. Remarkably, the current terrestrial DTV system specifies the Ginga middleware, a national technology, as the standard for multimedia interactivity since 2007. Ginga has been proven to support a consistent evolution that made it the first Brazilian technology adopted

as an international standard by ITU-T in 2009 [2] and recognized by ITU-R as an integrated broadcast-broadband system since 2017 [3].

TV 3.0 Project is currently under Phase 3¹, carrying out further tests and evaluations over the physical and video coding layers, as well as developing a reference mux/demux. Regarding the application coding layer, most of the innovative requirements established by the Call for Proposals (CfP) [4] are under study by selected Academia research groups, since those requirements were not appropriately addressed in the previous phases [5]. The CfP specified 17 requirement groups for application coding, including basic aspects on backward compatibility with Ginga specifications and its implementation reuse, besides support for TV 3.0 underlying technologies. The advanced requirements include support for application-based TV experience, immersive audiovisual content, multimodal interaction, sensory effects, multi-user profiling, audience measurement, IP convergence, and extensibility, just to name a few of them.

This paper focuses on the methodology, progress and early achievements of the Academia R&D team on addressing the high-priority application-coding requirements for TV 3.0. The team is composed of 40 researchers from 6 academic institutions, namely PUC-Rio, UFPB, UFF, UFJF, UFMA and CEFET-RJ. The work started in April 2023.

As a means of actively collaborating with the research methodology, SBTVD Forum's Technical and Market Modules jointly decided on a prioritization of requirements to determine the sequence of studies for the R&D team. In addition, the Forum's Application Coding Working Group (WG) specified initial guidelines on how to tackle each requirement, based on the evaluation results from Phase 2 and the WG's expertise on standardizing/implementing digital TV middleware. Finally, the WG specified a total of 7 use cases to be prototyped, aiming at validating the R&D solutions for the prioritized requirements and publicly demonstrating the new TV 3.0 application coding features. The R&D team diligently incorporated all SBTVD Forum contributions into its methodology, allowing for consistent progress on certain requirements.

¹ TV 3.0 Project Phase 3 is funded by the Brazilian Ministry of Communications (MCom), managed by the Brazilian Network for Education and Research (RNP).

First, relevant architectural changes in the application coding layer were already proposed and agreed, based on the fundamentals of Ginga specifications for Profile-D receivers. The requirements on application-based TV experience impose changes that include a new user interface for listing each broadcaster's initial application. In addition, a new media player is needed, capable of keeping running over application switches, regardless of whether the current audiovisual content is delivered over-the-air (OTA, broadcast) or over-the-top (OTT, broadband).

There is also significant effort in requirements engineering and social studies regarding this application-based TV experience, as mentioned before. The team is running focus groups and opinion polls with a probabilistic sample, as well as prototyping the entire viewer's journey based on the quanti/qualitative data obtained. This prototype will be further refined following the principles of Design Thinking, under discussion with a team of experts proactively assigned by RNP (Brazilian Network for Education and Research).

Another area of focus involves evaluating the features introduced by the adopted audio and video codecs, with the objective of identifying properties that can be utilized by applications and determining the necessary implementation support.

The extensibility requirement is also under study, with a focus on identifying Ginga-NCL and Ginga Common Core WebServices (Ginga CC WS) APIs as metadata so that new applications can obtain granular information about the functionality support of their interest in the receiver, thus allowing them to adapt according to the available resources.

A further R&D task has focused on the accessibility requirements, more specifically on the captioning part, where IMSC1 standard is adopted for encoding and transmitting subtitles and sign language gloss. It uses a subset of TTML, which consists of an XML file with several possible settings for captioning, such as position, color, font, display time, synchronism, emojis and images. In order to test and validate the forwarding of captions and gloss to mobile devices over the local network, a prototyping environment was developed, composed of a partial Ginga CC WS implementation and NCLua and HTML5 applications. New required APIs are added to Ginga CC WS prototype, in this case for the real-time forwarding of captions and gloss in TTML format over sockets or websockets. The synchronism between the applications is performed by the Ginga CC WS, which delivers the same content, at the same time, for all socket clients, the results are being evaluated. The gloss stream is shown in the application by a 3D avatar playing sign language.

The team has also been working on the implementation of use cases related to sensory effects, immersive content and multimodal interaction. To accomplish this, the team is working on harmonizing the adopted proposals NCL 4.0 [6] and Guaraná [11]. Combined, they allow for the inclusion of sensory effects (wind, scent, light, ...) in interactive multimedia applications and the execution of parts of the application on head-mounted displays connected to the TV, in a 360° scene including 3D objects, immersive MPEG-H 3D audio [12] and traditional multimedia objects. In addition, users will be able to interact with applications using different

modalities (voice, gestures...) using input recognition devices.

In conclusion, partial implementations of prototyped use case apps were demonstrated at SET Expo 2023 in the SBTVD Forum booth. This paper is structured as follows: Section II discusses the rationale and agreed-upon changes to the application coding architecture for TV 3.0. Section III describes the application-based TV experience and a projected viewer's journey, providing context for focus group discussions. Sections IV reports progress on application coding support for TV 3.0 audio/video codecs and application coding extensibility. Section V examines developments in supporting accessibility content, including second-screen delivery of captions and sign language glosses. Section VI presents achievements in immersive experiences support, encompassing sensory effects, multimodal/multiuser, and virtual reality content. Finally, Section VII offers concluding remarks. This paper includes diagrams and technical details for deepening the discussion on each study of this challenging project of unparalleled opportunity.

II. APPLICATION CODING ARCHITECTURE FOR TV 3.0

Several of the use cases designed for TV 3.0 clearly indicate the need for intensive use of multimedia applications, which, according to CfP TV 3.0 [4], will be based on extensions to Ginga specifications for Profile-D receivers (a.k.a. DTVPlay). Undoubtedly, it is through Ginga applications that broadcasters and partners will be able to leverage TV3.0 greatest innovations, including personalization of the TV content consumption experience, segmented programming, manipulation of additional content in more immersive formats, accessibility, sensory effects, as well as new forms of interaction. In addition, it is through Ginga applications that it will be possible to build and manipulate viewer profiles that enable such personalized experiences, obviously for the viewers who consent.

It is therefore expected that Ginga applications will be running and switching constantly on TV 3.0 receivers, leading to a need to rethink the application coding support specifications. Application coding becomes no longer an accessory for broadcasters, but a key element for enabling the vast majority of new TV 3.0 use cases. The CfP makes this clear through its requirements group AP6 "Enable application-oriented TV" [4]:

- AP6.1: application-oriented user experience with TV
- AP6.2: handling the presentation of all audiovisual content
- AP6.3: application switching delay (lower is better)

This represents, objectively, a paradigm shift, which in fact needs also to be discussed from the viewer's point of view, according to our study on the viewer journey possibilities, presented in Section III. Nevertheless, this evolution towards an application-oriented TV has to be reflected in the receivers' application coding support architecture. The challenge set to the TV 3.0 Project R&D team was to propose adaptations to the current Ginga architecture, according to ABNT NBR 15606-1, in order to maintain compatibility and to reuse, as much as possible, the existing implementations of TV 2.5 middleware components and subsystems.

The TV 2.5 middleware architecture can be depicted as shown in Figure 1. In summary, this architecture demonstrates the capability for broadcasters to transmit Ginga applications via OTA that are developed using NCL/Lua or HTML5/ Javascript languages. Consequently, the Ginga-NCL [13] or Ginga-HTML5 [14] presentation engines execute these applications based on the OTA signaling rules provided. The current APIs of both presentation engines offer interesting possibilities for integrating broadcast and broadband features in D-profile receivers. These features encompass receiving broadband content through adaptive streaming, with or without DRM protection, as well as facilitating TCP and UDP communication in both client and server modes. Additionally, the architecture supports content preparation to enhance the quality of the viewing experience during the seamless transition to broadband, including the insertion of targeted advertising, among other functionalities.

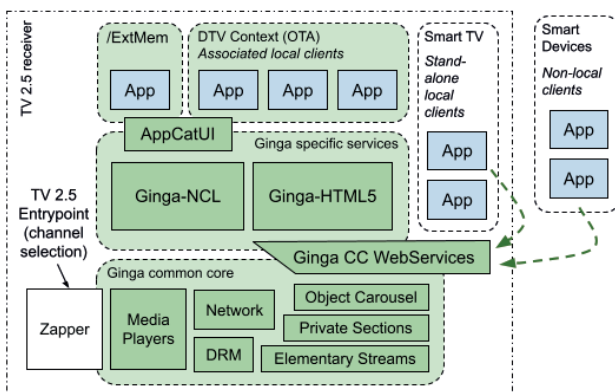


Figure 1. TV 2.5 middleware architecture.

In the case of Ginga-HTML5, since it exclusively employs W3C standardized APIs, all these resources are accessible through a decoupled API outlined in the Ginga CC WebServices specification [15]. This decoupling is achieved by utilizing a remote API that adheres to the RESTful architectural style. Consequently, this approach enables the same Ginga CC WebServices to provide TV 2.5 resources to applications beyond broadcasting, including those operating within the smart TV environment on the same receiver or on any smart device within the home network. However, access permissions must be granted by both the viewer and the broadcaster in such cases.

Even Ginga-NCL applications can utilize Ginga CC WebServices resources, particularly for use cases that encourage their integration with second-screen applications running on smart devices. For all other use cases, Ginga-NCL directly furnishes the required APIs through the NCL and Lua languages, potentially offering improved performance when accessing resources.

Starting from Profile C receivers², a component known as AppCatUI (Application Catalog User Interface) becomes available. This component serves the purpose of listing applications accessible within the current DTV context,

allowing viewers to trigger them. It also facilitates viewers in adding and removing applications, making them persistent, and initiating their execution. Such applications can be delivered OTA with appropriate installation permissions, installed from external memory devices (/ExtMem), or downloaded from authorized repositories accessible via broadband connections.

However, despite offering these possibilities, the current TV 2.5 specifications fall short of enabling an application-oriented TV approach for several reasons. Firstly, this limitation arises because the initial entry point into the TV content consumption experience revolves around the channel abstraction, typically managed by native software responsible for channel switching, depicted in Figure 1 with the suggestive term “zapper”. Notably, this “zapper” is not an integral part of the middleware specifications and, so, Ginga applications have only limited control over the behavior of the zapper. When they intend to present OTT content, for example, they are required to employ an additional media player, which usually has a lifecycle closely tied to the application itself. If an attempt is made to switch to another application, the current player instance would be terminated. This underscores the necessity of incorporating a persistent media player as an essential element of the new architecture for TV 3.0 application coding.

Moreover, the application-oriented paradigm holds the potential to conceal the concept of traditional channels, presenting each broadcaster as an application capable of providing access to its complete ecosystem of content and services. To achieve this goal, it is imperative to introduce a user interface, a component of the application coding layer, that can list each broadcaster's initial application and provide access to other applications offered by broadcasters for installation or execution. The existing AppCatUI can indeed list installed Ginga applications and those available in the current DTV context, but it lacks the capability to showcase an application at the primary UI level for each broadcaster. Its current channel-oriented approach restricts its prominence.

To address these specifics, the proposal, well-established between the R&D team and the SBTVD Forum for an application-oriented TV, suggests making adaptations to existing middleware architecture components. These changes aim to minimize the impact on current implementations while allowing viewers to embrace the new paradigm. The proposed architecture for coding TV 3.0 applications is depicted in Figure 2.

The revamped AppCatUI evolves into a free-to-air TV super app, serving as a front-end for viewers to identify available broadcasters, explore their content ecosystems, and configure profiles and other potential options previously absent in receivers. In this architecture, a persistent media player enables seamless switching between OTA and OTT content within broadcasters' applications without playback interruptions. The next application can then decide whether to maintain the current content, recommend new content, or

² Profile C was specifically designed for receivers distributed during the analog TV signal switch-off process, representing a significant evolution addressing advanced

requirements for implementing public policies and digital inclusion [16]

switch automatically to other content, all with the viewer's best experience in mind.

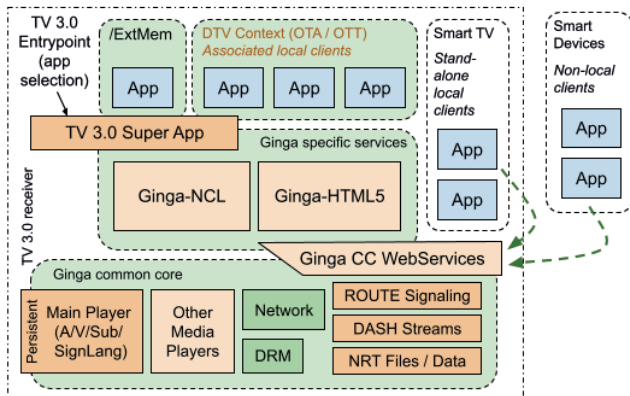


Figure 2. Proposed TV 3.0 application coding architecture.

The figure also incorporates new components to access resources from other TV 3.0 system layers, notably the transport layer based on the ROUTE/DASH specification. Additional extensions to this architecture, discussed in Section VII, support integration with sensory effects, advanced interaction recognition, and virtual reality devices. It is anticipated that APIs supported by Ginga-NCL and Ginga CC WebServices will be expanded to accommodate solutions for the ongoing requirements.

To list an initial application for each broadcaster within the so-called free-to-air TV “super app”, the conventional and time-consuming channel scanning process can be presented to viewers as an application discovery process. To expedite this process in TV 3.0, various options are being considered. These include the automatic instantiation of each application by the free-to-air TV super app, eliminating the need for individual application downloads for each station found. Additionally, when the receiver is connected to the internet, a new discovery web service could provide a list of licensed broadcasters in the installation region. This could enable automatic instantiation of an application, even in cases of weak signals, directing viewers to the broadcaster's linear OTT content if available. Another advantage of such a discovery service is the potential for automatic updates to the applications list, eliminating the need for repeated scanning processes as currently required for adding new TV channels.

These innovative possibilities are designed to enhance the viewer's experience and can be assessed through experimental prototyping of the entire viewer journey, even involving TV receiver aspects beyond the scope of free-to-air digital TV standards. The subsequent section outlines the initial steps in designing a possible viewer/interactor journey.

III. APPLICATION-BASED TV EXPERIENCE

Application-oriented TV is the central concept for understanding the paradigm shift proposed for the third generation of Brazilian digital TV. The change is technological, but also cultural, as it alters the way viewers traditionally relate to accessing the content offered by

broadcasters. In the proposed model, channels will be replaced by applications offered by broadcasters. From this initial application, each broadcaster will be able to create its own ecosystem of internal apps and offer content both OTA and OTT, which the viewer will access depending on the existence of connectivity on their Smart TV.

This evolution makes sense in a scenario in which the predominant Smart TVs on the market already offer FAST (Free Ad-Supported Television) channels, which compete without regulation for the audience with open channels distributed by broadcast. In addition to FAST channels, there is a whole range of streaming applications that occupy the screen and, in the case of televisions connected to the Internet, monopolize viewers' choice. In fact, there are even keys dedicated to streaming services on the minimalist remote controls. In fact, on these televisions, it is increasingly difficult for viewers to find the free-to-air TV channels whose content they want to consume. The proposal for an application-oriented television paradigm attempts to resolve this issue by offering the viewer an experience in which they can easily identify the devices' native apps and the applications from free-to-air broadcasters.

To facilitate the design of a possible viewer/interactor³ journey (see subsection III.A), we firstly focused on assessing the interfaces of current smart TVs and studied video streaming on digital platforms. The examination included studying the most commonly used smart TV models in the Brazilian market, based on operating systems such as Roku TV, Android TV or Google TV, WebOS, and Tizen. These platforms exhibit differences in content presentation and viewer interaction. Roku TV and Android TV prioritize application presentation, while WebOS and Tizen focus on keeping audiovisual content on the screen for extended periods, overlaying settings, menus, and other applications only when activated by the viewer. Across all systems, free-to-air TV content occupies a distinct application space, varying in colors, icons, and terminology.

In the analysis of streaming services and their interfaces, we aimed to identify familiar paths for audiovisual consumers, seeking to adapt these experiences to new interactive actions and requirements for a possible TV 3.0 super app interface. We observed that different platforms often share similarities in presenting content on their home screens, primarily dedicated to on-demand content. Tabs categorize content by genre and format, such as drama, comedy, sports, and news. Live content is typically featured within specific applications. For instance, Globoplay includes live TV content, including simultaneous broadcasts from Globo and other affiliated channels. RTVEplay prominently displays live content on its platform, and Pluto TV offers live content on its home page while organizing on-demand content in a separate tab.

Initial findings have been incorporated into a proposed viewer's journey model, including icon arrangement on TVs, the importance of a universally recognizable identifier for free-to-air TV, and the need to carefully consider the relationship between viewers/interactors and the TV 3.0

³ Murray [18] defines an interactor as someone who effectively interacts with content on a media device.

super app interface to ensure a seamless transition for those accustomed to traditional TV.

We are also exploring the concept of a "networked time" called "Timelink" to free viewers from rigid linear TV scheduling. To establish Timelink and provide viewers with time control, an intuitive program guide using deep links in Electronic Program Guide (EPG) metadata sent by broadcasters is crucial. While browsing the guide, viewers can access detailed information about each content item and initiate playback with a simple click. The guide can also signal which content is immediately available, considering viewer preferences and internet connectivity. This guide streamlines access to both OTA and OTT content.

In a non-linear TV landscape, a more efficient and intelligent use of remote control, particularly the colored buttons, is under investigation.

Lastly, the concept of a second screen is being reimaged as a mirror of the television screen on a separate device, a departure from the current practice of integrating the remote control within the TV interface.

A. A VIEWER'S JOURNEY PROPOSAL FOR EVALUATION OF THE APP-ORIENTED TV EXPERIENCE

The proposal for a viewer's journey of an application-based television, reproduced below, considers cultural, social and economic aspects of how Brazilians consume audiovisual content on free-to-air TV from the time the device is turned on for the first time to be configured until the moment the viewer chooses and watches what is being broadcasted.

An important TV 3.0 feature lies in personalizing content according to the viewer's preferences. When turning on the TV for the first time, the viewer is invited to choose the configuration language, which includes accessibility options with audio description. This is followed by the possibility of defining a profile that can be shared with broadcasters, with the definition of important characteristics such as whether it is a child and what age recommendation for content is suggested. Figure 3 illustrates this viewer profile creation screen.



Figure 3. Viewer profile screen.

Instead of the channel scanning process, in TV 3.0 there is the process of discovering initial apps from broadcasters. This process is based on the geographic location of the receiver, so it will list the stations that are available in that region. Figure 4 illustrates the discovery of three broadcasters.

In Figure 5, the purpose of this screen is that the viewer can easily identify where free-to-air TV stations are found on

Smart TVs. This screen represents a possible harmonization with a clear indication of what are OTT streaming apps, broadcast apps and FAST channels.



Figure 4. Broadcaster scanning.

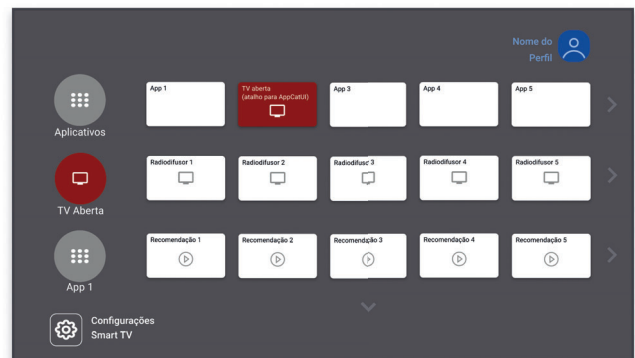


Figure 5. Home screen harmonizing streaming and broadcast TV apps.

Figure 6 shows the super app environment, a screen where all the initial apps for free-to-air TV broadcasters in the region are listed for the viewer. This screen corresponds to the usual broadcast TV screen, which is zapped using the remote control in the traditional way.



Figure 6: Super app environment.

Figure 7 illustrates the initial app of a broadcaster. Here, the viewer has access to traditional, linear audiovisual content that comes over the air. To watch this content, the TV receiver does not need to have an active Internet connection and the broadcaster has some control over it, including visual identity settings to be applied to such a common initial app.

Finally, in Figure 8, we see the recommendation ecosystem of a broadcaster that suggests both OTA and OTT content. Depending on the receiver's connectivity, they will have access to a larger catalog of content.

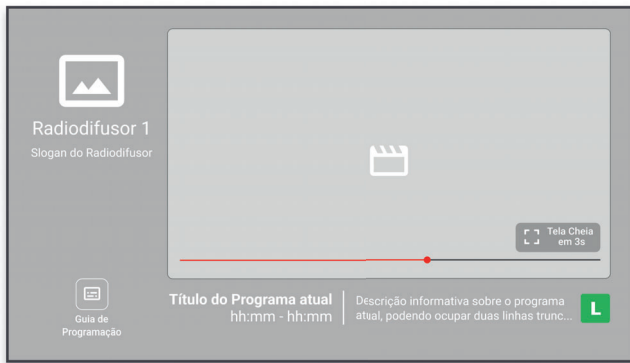


Figure 7: Broadcaster initial app.



Figure 8: Broadcaster content recommendation ecosystem.

IV. APPLICATION CODING SUPPORT FOR TV 3.0 AUDIO/VIDEO CODECS AND EXTENSIBILITY

Following the recommendations resulting from the tests and evaluations of TV 3.0 Project Phase 2, new video and audio codecs will be incorporated into TV 3.0. At the application layer, the R&D team has been working on how to provide support so that applications can use the advances and features of these new media. Efforts have been put into finding and integrating decoders and players for the video codecs adopted for standardization - Versatile Video Coding (VVC) ISO/IEC 23090-3, MPEG-I part 3 and Low Complexity Enhancement Video Coding (LCEVC) MPEG-5 Part 2 - which brings with it several advantages, such as better video quality with lower bit rates than its predecessors. Furthermore, the team is also committed to integrating the MPEG-H audio (ISO/IEC 23008-3) player, developed by the proponents themselves, which in addition to reproducing the new immersive audio standard, also features an interface that allows interaction with audio objects and customization of the various functionalities offered, such as changing channels to choose a track, selecting a language, etc.

Concerning the extensibility requirement, the team has focused on surveying the APIs for listing receiver properties and resources, both in Ginga-NCL and Ginga CC WS. The idea is that these APIs can be updated and harmonized according to new features introduced with the TV 3.0 project, such as version 4.0 of the NCL language. Therefore, TV 3.0 applications will be able to consult what features and functionalities are available on a receiver, and thus be able to adapt to them. This can allow even different receivers to run applications with adapted functionalities.

V. APPLICATION CODING SUPPORT FOR ACCESSIBILITY CONTENT

To test and evaluate the transmission and reception of captions, sign language glosses and audio description a prototyping environment was proposed.

This environment is centered on the Ginga CC WS server, which manages the distribution and synchronization of the accessibility media. A REST API, which is still under development, has been extended from the existing one in TV2.5. It provides routes that allow a client, external to the TV and connected to the same local network, to access this media, as long as it is authenticated on the TV.

In this way, client applications can request and access the sign language gloss, subtitles and audio description media. From this, various scenarios can be explored. In the case of hearing-impaired viewers, the glosses received can be displayed in Sign Language visual format on the user's device, without overlaying the video being shown on the TV screen. In the case of subtitle display, different viewers can access subtitles in the language they prefer, allowing different people to receive different content. And the audio description client running on their cell phone can receive the audio so the user can listen to it through headphones, without disturbing other viewers.

This allows content to be customized simultaneously and in a non-imposing way, since each user can have their own customization on their personal device, without interference from others.

Figure 9 shows this environment and demonstrates the three scenarios presented. It's possible to see the Ginga CC WS server on the TV delivering the 3 accessibility media contents to the mobile devices via a Wi-Fi network. Each device receives its media and plays it according to its type. An accessibility user can view or listen to the content received on the devices.

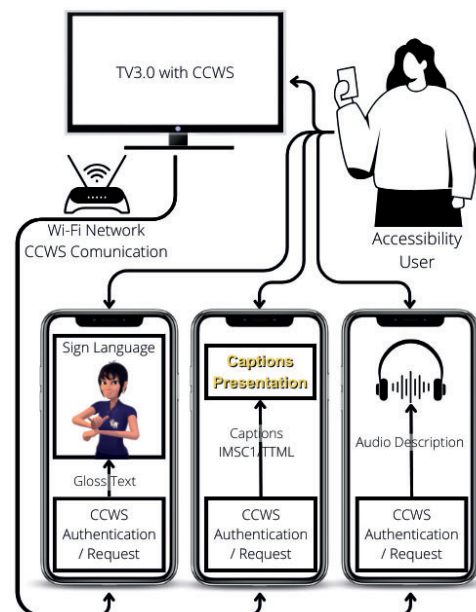


Figure 9: Accessibility prototyping environment.

The Ginga CC WS implementation was done in node.js and it relies on a static cyclic content to simulate a real environment.

The media to be provided were prepared in such a way that

the subtitles, glosses and audio description had equivalent content. To do this, the subtitles for a given video were generated manually, followed by their translation into glosses using the VLibras translator [10]. The audio file was produced and recorded by one of the team members. To simulate a real broadcast environment, in which subtitles and glosses are broadcast continuously, they were segmented into 2-second chunks, and each was stored in a different TTML file. In this way, the content is transmitted every 2 seconds to clients connected via sockets or websockets. At the end of the file transmission, the Ginga CC WS server restarts the cycle, transmitting the first files again.

The test application was created using HTML5 and Javascript. It offers both a desktop version suitable for TV screens and a mobile version optimized for mobile devices. Regardless of the platform it's accessed from, the application consists of three main modules: one for displaying sign language, another for showing captions, and a third for playing audio descriptions.

The visual representation of captions in IMSC1 format is done using the open-source library imscJS [8]. This library interprets the content present in IMSC1/TTML subtitle files, allowing subtitles to be displayed in the application with the appropriate graphic formatting.

The sign language module receives the glosses from the Ginga CC WS server via a websocket. For the representation in sign language format, the application was integrated with the VLibras Widget [7], a tool that has a 3D avatar that reproduces the glosses in sign language format.

The audio description module requests the Ginga CC WS server to this media and receives the HTTP URL for the audio in DASH format [9]. The audio is then played back and the user can listen to it on their mobile device's speaker or through connected headphones.

Figure 10 shows this application running during SET Expo 2023. It's possible to see the caption and sign language modules in execution at the same time on TV and on a tablet device.



Figure 10. Accessibility application for mobile and TV.

VI. APPLICATION CODING SUPPORT FOR IMMERSIVE EXPERIENCES

Regarding the support for immersive experiences, the R&D team presented two use case applications during SET Expo 2023. The first focused on the execution of sensory effects and multimodal/multiuser support. The second allowed executing parts of the application on a head-mounted display (HMD) connected to the TV.

Sensory effects are used in entertainment (e.g cinema and games) to increase the user experience providing more immersion when consuming content. Aiming to provide immersive experiences in Digital TV environments, NCL 4.0 allows integrating sensory effects into interactive TV applications. In the first immersive experience use case, the R&D team specified an NCL 4.0 application that allows synchronizing light and aroma sensory effects with the audiovisual content transmitted by the broadcasters.

For the Ginga middleware to support the execution of the multisensory applications specified in NCL 4.0, it is necessary to add components capable of communicating with sensory effect renderers in the DTV receiver environment. In this way, the multisensory application will be able to activate/deactivate sensory effects and control effect presentation characteristics, such as position, the light effect color, the smell of the aroma effect, etc.

The sensory effects rendering is performed by the component named *Sensory Effect Renderer* present in Ginga common core as illustrated in Figure 11. Each *Sensory Effect Renderer* effect is associated with only one sensory effect and vice versa. The renderer defines interfaces enabling the Ginga-NCL formatter to communicate with the rendering devices and trigger actions such as starting the effect presentation or preparing a sensory effect to guarantee temporal synchronization of the application.

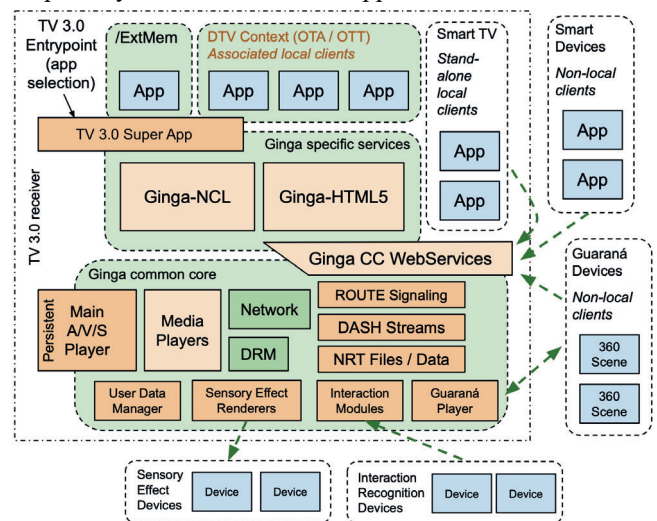


Figure 11. Ginga architecture to support immersive applications

The physical devices responsible for rendering effects can be from different manufacturers and implement different communication protocols. This communication must be implemented by the Device API, which is specific to each rendering device. The Device API must implement a set of functions such as connection to the physical device, activation/deactivation and commands to modify the effect intensity.

Another feature of TV 3.0 is the support of user interaction using different modes of interaction such as gestures, voice and even facial expression recognition. For example, a broadcaster can transmit an NCL 4.0 application capable of adapting the content presented according to the viewer's facial expressions that it identifies.

User interactions with the multimedia application are

managed by *Interaction Modules* present in Ginga common core. These interaction modules communicate with physical devices through predefined methods and notify the middleware when an interaction has been recognized. Additionally, the module can inform the middleware the user that performs an interaction if the recognition device is capable of identifying the user.

The first demo application showcased during SET EXPO 2023 is a travel show that presents four videos related to tourist attractions in the city of Rio de Janeiro. Initially, the application presents two videos related to beaches of Rio de Janeiro (Ipanema and Copacabana). In both videos, a sea aroma is triggered by the application. Furthermore, a yellow light effect is presented when the sunset appears in Ipanema, and a blue light effect happens when it is a sunny morning in Copacabana. The third video presents the Botanical Garden that is synchronized with a green light effect. Additionally, the viewer can interact with the third video using gesture interaction to pause or resume the video, as illustrated in Figure 12.



Figure 12. Support for gesture interaction.

Finally, the last video presents Christ the Redeemer and a voice-based viewer interaction is asked in order to choose the last part of the show. Based on the viewer's choice, a personalized fifth video is presented. When a viewer interacts, his/her profile identification, which is already registered in the TV receiver, is recognized and shown, as presented in Figure 13. This use case also demonstrates that TV 3.0 can identify the viewer that interacts with it.



Figure 13. Support for user interaction identification.

In the use case related to the Guaraná proposal, the user starts its experience on a broadcaster's application. In that application the user has the option to watch a program where

additional content is executed in an HMD. That program presents a classical music performance inside the Tiradentes Palace in Rio de Janeiro. The same content presented on the TV is available in 360° in the viewer's HMD. Together with the 360° video, the application presents photos of the palace and a video presenting the palace's architecture. Whenever the viewer turns its head in the direction of the orchestra conductor, an image describing his biography is presented. Figure 14 presents an overview of the 360° scene presented in the HMD.



Figure 14. 360° scene overview.

To implement that use case the R&D team used an implementation of the middleware Ginga Common-Core Web Services component (CC-WS) with the new API proposed for registering remote devices that will execute part of the application (in this case, a 360° scene). Once a device registers itself as a remote device, the CC-WS creates a WebSocket for the bidirectional communication between CC-WS and HMD. Once the main application (executed at the TV) starts its execution, *i.e.*, the 2D version of the orchestra presentation, at the TV, the CC-WS component transmits to the HMD the description of the 360° scene. As the presentation unfolds, the CC-WS component sends commands instructing the HMD to start/stop presenting the content in the scene. Whenever the Guaraná logo at the orchestra conductor is in the user field of view, the HMD sends to CC-WS an interaction report indicating the start of the View event of the logo. The same is performed when the logo exits the field of view, triggering the end of the View event. Once the CC-WS receives a start/stop of the View event, it replies to the HMD with a command to start/stop the conductor biography.

VII. FINAL REMARKS

In conclusion, this paper presents a comprehensive exploration of the innovative TV 3.0 project, focusing on the R&D progress on various aspects of the application coding layer.

TV 3.0 project has ushered in a new era of television technology by prioritizing an application-oriented TV experience. Through meticulous research and development, the project has been fundamental to rethink how viewers interact with television content. The transformation of the traditional TV interface into a versatile, application-centric platform has the potential to enhance user engagement and to offer viewers a personalized control over their content

consumption.

However, it's important to acknowledge that the TV 3.0 project remains a work in progress. The application coding requirements addressed in this paper are part of an ongoing journey, and solutions will continue to evolve. As the project progresses, it is expected that the remaining requirements will also be tackled with innovative solutions, further enhancing the TV 3.0 possibilities.

Extensibility plays a crucial role in the TV 3.0 project, with a commitment to evolving APIs in Ginga-NCL and Ginga CC WS. This adaptability ensures that TV 3.0 applications can seamlessly integrate with a wide range of receiver configurations, accommodating diverse user preferences and hardware capabilities. The ongoing development in this area promises even greater flexibility and compatibility in the future.

Accessibility is at the forefront of TV 3.0, with a strong emphasis on customization. The project's dedication to providing tailored captions, sign language glosses, and audio descriptions ensures that television content is inclusive and accessible to a wide audience. As the project matures, these accessibility features will continue to evolve to meet the evolving needs of viewers.

The paper also delves into the realm of immersive experiences, demonstrating TV 3.0's capability to synchronize sensory effects, support multimodal/multiuser interactions, and integrate with head-mounted displays. These developments represent a significant shift in television engagement, offering viewers interactive and captivating content experiences.

The TV 3.0 project, in general, is promoting the way for a future where television transcends its traditional confines and provides viewers with unparalleled and personalized experiences. This paper serves as a testament to the exciting possibilities and innovations that lie ahead in the realm of TV 3.0, with the understanding that the journey is ongoing, and the best is yet to come.

• REFERENCES

- [1] SBTVD Forum. "TV 3.0 Project". Website. https://forumsbtvd.org.br/tv3_0
- [2] ITU-T. Recommendation ITU-T H.761 (2009) "Nested Context Language (NCL) and Ginga-NCL"
- [3] ITU-R. Recommendation ITU-R BT.2075-1 (2017) "Integrated broadcast-broadband system"
- [4] SBTVD Forum. "Call for Proposals (CfP): TV 3.0 Project". <https://forumsbtvd.org.br/wp-content/uploads/2020/07/SBTVDTV-3-0-CfP.pdf>
- [5] SBTVD Forum. TV 3.0 Project - Phase 2 - Results https://forumsbtvd.org.br/tv3_0/#panel-phase2
- [6] BARRETO, F. ; DE ABREU, R. S. ; JOSUE, M. I. P. ; MONTEVECCHI, E. B. B. ; VALENTIM, P. A. ; MUCHALUAT-SAADE, D. C. . Providing multimodal and multi-user interactions for digital tv applications. MULTIMEDIA TOOLS AND APPLICATIONS, v. 82, 2023. <https://link.springer.com/article/10.1007/s11042-021-11847-3>
- [7] Universidade Federal da Paraíba (UFPB). 2023. VLibras - Governo Digital. <https://vlibras.gov.br/>. Online; Accessed on August 30, 2023.
- [8] Pierre-Anthony Lemieux, Nigel Megitt, and Robert Bryer. 2022. ImscJS Repository. <https://github.com/sandflow/imscJS>. Online; Accessed on August 30, 2023.
- [9] British Standards Institution. 2022. ISO/IEC 23009-1 AMD 1. Information Technology. Dynamic Adaptive Streaming Over HTTP (DASH).: Part 1. Media presentation description and segment formats. Technical Report pt. 1. <https://www.iso.org/standard/83314.html>
- [10] Luana S. Reis, Tiago M. U. Araújo, Yuska P. C. Aguiar, Manuella A. CB Lima, and Angelina S. S. Sales. 2018. Assessment of the treatment of grammatical aspects of machine translators to Libras. XXIV Simpósio Brasileiro de Sistemas Multimídia e Web. Anais Salvador, Brasil: SBC-Sociedade Brasileira de Computação, 2018. DOI: <https://doi.org/10.5753/webmedia.2018.4570>.
- [11] Gabriel Souza, Daniel Silva, Matheus Delgado, Renato Rodrigues, Paulo R. C. Mendes, Glaucio Fiorott Amorim, Alan L. V. Guedes, and Joel dos Santos. 2020. Interactive 360-Degree Videos in Ginga-NCL Using Head-Mounted-Displays as Second Screen Devices. In Proceedings of the Brazilian Symposium on Multimedia and the Web (São Luis, Brazil) (WebMedia '20). ACM, New York, NY, USA, 289–296.
- [12] O. Major, Z. Shaban, B. Czelhan, A. Murtaza. "Immersive Audio Application Coding Proposal to the SBTVD TV 3.0 Call for Proposals". SET International Journal of Broadcast Engineering, vol. 7, pp. 48-56 2021. ISSN Print: 2446-9246 ISSN Online: 2446-9432. doi:10.18580/setijbe.2021.4.
- [13] ABNT Standard NBR 15606-2 (2023) "Digital terrestrial television - Data coding and transmission specification for digital broadcasting - Part 2: Ginga-NCL for fixed and mobile receivers - XML application language for application coding"
- [14] ABNT Standard NBR 15606-10 "Digital terrestrial television - Data coding and transmission specification for digital broadcasting - Part 10: Ginga-HTML5 - Ginga HTML5 profile specification"
- [15] ABNT Standard NBR 15606-11 "Digital terrestrial television - Data coding and transmission specification for digital broadcasting - Part 11: Ginga CC WebServices - Ginga Common Core WebServices specification"
- [16] CASTRO, Cosette; BARBOSA FILHO, André. Proyecto Brasil 4D Interactividad en televisión pública. Rev. Cienc. Soc. [online]. 2016, vol.29, n.38, pp.145-159. ISSN 0797-5538.
- [17] G. K. Walker, T. Stockhammer, G. Mandyam, Y. -K. Wang and C. Lo, "ROUTE/DASH IP Streaming-Based System for Delivery of Broadcast, Broadband, and Hybrid Services," in IEEE Transactions on Broadcasting, vol. 62, no. 1, pp. 328-337, March 2016, doi: 10.1109/TBC.2016.2515539.
- [18] Murray, Janet H. (1997). Hamlet on the Holodeck: The Future of Narrative in Cyberspace. New York: Simon & Schuster. ISBN 068482723-9.

A Python Tool to Predict Wireless Network Signals in Indoor Environments using Neural Networks

Breno Batista Nascimento, Silva, and Edson Tafeli C.Santos

Abstract — The use of neural networks proved to be effective in creating more accurate predictive models compared to traditional approaches. The Python tool developed made it possible to train and adjust these models based on the information collected, taking into account factors such as the physical structure of the site, obstacles present and building materials. The results obtained during the research indicated significant improvements in prediction accuracy compared to conventional methods. This suggests great potential for the practical use of the tool in real-world scenarios, such as the planning and optimisation of indoor wireless networks, contributing to more stable and reliable connectivity indoors. The aim of this work was to create a Python-based tool that uses neural networks to predict wireless network signals in indoor environments. The innovative approach, which combines mapping and field measurements, demonstrated an increase in the accuracy of predictions, promoting advances in the efficiency and reliability of wireless networks in indoor spaces.

Index Terms — Signal prediction , propagation model , neural networks , perceptron's .

I. INTRODUCTION

The widespread use and availability of wireless networks has revolutionized modern connectivity, enabling seamless data transmission and interaction between devices. However, the complex challenges associated with signal propagation in indoor environments, characterised by obstacles, interference, and signal attenuation, represent obstacles to ensuring consistent and reliable performance of wireless networks. This work addresses these challenges by introducing an innovative tool created using the Python programming language. The tool uses neural networks to improve the prediction and accuracy of wireless network signals, based on measured data for mapping and training on real-world measurements.

This contribution focus on a comparative analyses of path loss propagation models in indoor industrial environments at 2.4 GHz Industrial, Scientific and Medical (ISM) band and 5.0 GHz, Wi-Fi.

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The main objective of this article was to develop a tool based on an empirical propagation model to provide first-order coverage prediction results in indoor environments using low-cost tools.

The starting point of this work is the one-slope model for training the neural network that was implemented.

II. PATH LOSS PROPAGATION MODELS

Radio frequency signals are the main mechanism for propagating information. The basic model of radio propagation is based on the transmitter and receiver and the transmission medium. Propagation in confined media occurs when the electromagnetic wave passes through a material medium in a closed environment, thus limiting a region of space where multiple reflections of signal infractions can occur.

A. One – Slope Model

The path loss in dB is given by

$$L_{dB} = L_{0,dB} + 10n \log(d) \quad (1)$$

where $L_{0,dB}$ is the path loss obtained at distance of 1.0 m from the transmitter and path loss exponent n is determined

TABLE I – $L(d_0)$ FOR VARIOUS VALUES AND FREQUENCIES

$L(d_0)$ (dB)	
Frequency (MHz)	L_0
900	31.5
1900	38.0
2400	40.2
4000	44.5
5300	46.9

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experimentally using a linear interpolation procedure [1].

the environment that allows it to evaluate the quality of its action.

III. NEURAL NETWORKS

Artificial Neural Networks (ANNs) are data structures based on the functioning of the human brain, it is a bio-inspired computational model, this data structure is made up of artificial neurons, which are inspired by natural neurons. The brain is a highly complex, non-linear and parallel computer (information processing system). It has the ability to organize its structural constituents, known as neurons, in such a way as to carry out certain processing (e.g. pattern recognition, perception and motor control) much faster than the fastest existing computer[2].

Neural networks have a network of artificial neurons that are interconnected, and through Learning Algorithms, simulate the decision-making capacity of the human brain. A neural network is a massively parallelized processor made up of simple processing units that have the natural propensity to store experiential knowledge and make it available for use.

It resembles the brain in two respects:

- Knowledge is acquired by the network from its environment through a learning process.
- Connection strengths between neurons, known as synaptic weights, are used to store the acquired knowledge.

The learning process of ANNs is one of the important qualities of these structures. The term "learning" corresponds to the process of adjusting the network's free parameters through a mechanism of presenting environmental stimuli, known as input or training patterns (or data): Stimulus -> adaptation -> new network behaviour.

There are basically three learning paradigms:

Supervised learning: also known as teacher learning, in which the teacher has knowledge of the environment and provides the desired input-response example set. Training is done using the error correction learning rule.

- Unsupervised learning: there is no supervisor to evaluate the network's performance in relation to the input data. No error measure is used to feed back to the network. They generally employ a competitive learning algorithm (the network's output neurons compete to become active, with a single neuron winning the competition).
- Reinforcement learning: there is no direct interaction with a supervisor or specific model of the environment. Generally, the only information available is a scalar value that indicates the quality of the ANN's performance. During the learning process, the network tests some actions (outputs) and receives a reinforcement signal (stimulus) from

IV. METHODOLOGY

The procedures of this study were structured in different stages, with the aim of evaluating the effectiveness of the Multilayer Perceptron Artificial Neural Network (MLP ANN) in predicting Wi-Fi signal loss in indoor environments. The stages were outlined as follows:

A. Creation and Training of the RNA-MLP

At this stage, the RNA-MLP was created and configured using the neurolab library in Python. The data collected, containing information on distance and Wi-Fi signal loss, was used to train the neural network. The structure of the RNA-MLP consisted of input layers, one or more intermediate layers and an output layer. Training was carried out using the gradient descent algorithm to adjust the network's synaptic weights, minimizing the prediction error.

```
#!/pip install neurolab
import numpy as np
import matplotlib.pyplot as plt
import neurolab as nl

#Montar o Google Drive no Colab (caso os dados estejam no Google Drive)
from google.colab import drive
drive.mount('/content/drive')

#Caminho para o arquivo .txt
file_path = '/content/TesteSalaPrincAzimute(1).txt'

#Aquisição de Dados a partir de um arquivo .txt
mat = np.loadtxt(file_path)
vetDist = mat[:, 0].reshape(-1, 1) # Dist em Metros
vetPerda = mat[:, 1].reshape(-1, 1) # Perda em dbm
freq = 2412 # Frequencia em Mhz
```

Fig. 1 Data import via txt file in python Colab.

The code extract in question describes the creation, configuration, training and evaluation of an Artificial Neural Network (ANN) using the "neurolab" library in Python. The neural network is designed to predict Wi-Fi signal losses based on the distances between measurement points and the corresponding signal losses.

B. Creation of the Neural Network

The neural network is initialised using the newff() function from the "neurolab" library. In this case, the network is configured with an input layer, an intermediate layer with 24 neurons and an output layer with 1 neuron. The minimum and maximum distance ranges (vetDist) are supplied as input to the network's input layer.

```
#Criação de uma nova Rede Neural
redeneural = nl.net.newff([np.min(vetDist), np.max(vetDist)], [24, 1], [nl.trans.LogSig(), nl.trans.PureLin()])
```

Fig. 2 Create Neural network

C. Definition of Neural Network Properties

The neural network is configured to use the gradient descent training algorithm (train_gd) and the sum of squares error function (SSE()) to evaluate the prediction error. In addition, the neural network is initialised.

```
#Definição das propriedades da Rede Neural
redeneural.trainf = nl.train.train_gd
redeneural.errorf = nl.error.SSE()
redeneural.init()
```

Fig. 3 Definition of the Neural Network's properties.

D. Neural Network Training

The training stage is carried out using the neural network's train() method. In this case, the distance data (vetDist) and the corresponding signal losses (vetLoss) are used to train the neural network. Training is conducted for a specific number of epochs (in this case, 50,000 epochs) and the error value is displayed periodically (every 1×10^{-25}).

```
#Treinamento da Rede Neural
error = redeneural.train(vetDist, vetPerda, epochs=50000, show=1*10**-25)
```

Fig. 4 Neural Network Training

E. Comparison to Field Tests

At this stage, the results obtained by the RNA-MLP were compared with real data collected through field tests. The field tests involved directly measuring Wi-Fi signal strength at different distances within the environment. The comparison sought to verify the ability of the MLP-NRNA to accurately predict signal loss compared to practical observations.

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
The maximum number of train epochs is reached
Valores Medidos de Perda:
[-50. -48. -56. -55.]
Valores Calculados a partir da Rede de Perdas:
[-50. -48. -55.5 -55.5]
```

Fig. 5 Values collected in field measurements.

F. Comparison with the OneSlope Model

This stage involved comparing the results obtained by the RNA-MLP with the values calculated using the OneSlope propagation model. The OneSlope model is an analytical approach to estimating signal loss in indoor environments. The aim of the comparison was to assess the ability of the RNA-MLP to overcome the limitations of the traditional analytical model and provide more accurate predictions.

```
import numpy as np

def oneSlop(Ld0, n, dist):
    t = len(dist)
    L = np.zeros(t)

    for i in range(t):
        L[i] = Ld0 + 10 * n * np.log10(dist[i])

    return L
```

Fig. 6 One Slope function.

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
The maximum number of train epochs is reached
Valores Medidos de Perda:
[-50. -48. -56. -55.]
Valores Calculados a partir da Rede de Perdas:
[-50. -48. -55.5 -55.5]
peOneSlop [-40.76165386 -49.14388397 -49.51140923 -49.06531926 -50.20650692
-50.53908435 -50.85459647 -51.16283218 -51.46143394 -51.75989575
-52.03202089 -52.30502377 -52.57044302 -52.82868789 -53.08013695
-53.3251361 -53.56401051 -53.79705813 -54.02455646 -54.24676365
-54.46392004 -54.67625973 -54.88396496 -55.08725941 -55.28631825
-55.48131438 -55.67241032 -55.85975904 -56.04350467 -56.2237832
-56.40072385 -56.57444563 -56.74506585 -56.91269258 -57.07742905
-57.23937325 -57.39861824 -57.55525255 -57.70936038 -57.86102196
-58.01031372]
```

Fig. 7 Results of models .

G. Error evaluation

In this step, the average errors and squared errors for the MLP-NRNA predictions were calculated in relation to the actual results and the values estimated by the OneSlope model. This evaluation quantified the performance of the MLP-NRNA in terms of its ability to accurately predict Wi-Fi signal losses.

```
#Cálculo dos Erros
def ermedio(y_true, y_pred):
    return np.mean(np.abs(y_true - y_pred))

def ermquad(y_true, y_pred):
    return np.mean((y_true - y_pred) ** 2)

#Cálculo do Erro Médio e Erro Quadrático para a Rede Neural
ErroMedioRN = ermedio(vetPerda, perdasRN)
ErroQuadRN = ermquad(vetPerda, perdasRN)

#Cálculo do Erro Médio e Erro Quadrático para o OneSlop
ErroMedioOS = ermedio(vetPerda, peOneSlop)
ErroQuadOS = ermquad(vetPerda, peOneSlop)
```

Fig. 8 Calculation of the average error and squared error for the models used.

H. Construction of graphs for data presentation

In order to better visualise the models used, graphs were drawn in Python, using the matplotlib.pyplot library. This library has a wide variety of graphs and in this research the point graph was used, based on the distance and losses measured.

```
plt.plot(vetDist , vetPerda, 'r', linewidth=5)
plt.plot(vetDist,perdasRN, 'b', linewidth=2)
plt.plot(d, peOneSlop, 'g', linewidth=3)
#plt.plot(vetDist, pFriss, 'black',linewidth=4)

plt.legend(['Valores Reais', 'Rede Neural', 'OneSlope', 'Friss'])
plt.title('Distância x Perdas')
plt.xlabel('Distância (m)')
plt.ylabel('Perdas (dBm)')

plt.show()
```

Fig. 9 Code developed for creating graphs and presenting results.

V. NUMERICAL AND MEASUREMENT RESULTS

The test environment was Building 6 of the School of Engineering, which has three floors of classrooms. The measurements were carried out on the 5 GHz Wi-Fi signal.

The Table II contains information on 5G signal loss measurements carried out in different rooms, where the crucial input for the prediction is the distance between the router and the measurement point.

TABLE II – MEASUREMENTS TAKEN TO TRAIN THE NEURAL NETWORK

BUILDING 6/ 3rd FLOOR						
Environment	Heights (m)	Length (m)	Depth (m)	Distância Roteador – Ponto (m)	Losses measured in Notebook(dB)	Losses measured in Mobile (dB)
302	3.65	7.51	11.1	1	-31	-45
311	3.96	6.85	6.13	20	-87	-89
312	3.95	8.44	6.07	16.7	-89	-90
313/315	3.98	6.3	12.7	13.5	-86	-76
314	3.96	8.45	6.6	13	-85	-85
304	3.98	7.16	8.8	-	-	-
305	4.02	6.15	8.4	-	-	-
306	4.01	8.84	8.47	-	-	-
307	4.01	6.17	6.45	-	-	-
308	4.16	9.91	6.44	-	-	-
309	4.03	7.1	7.81	-	-	-

The measurement procedure was carried out as follows :

- Room: The number of the room or environment where the measurements were taken.
- Distance Router - Point: The distance in some standard of measurement (such as metres) between the router (signal source) and the measurement point inside the room.
- Notebook: The amount of signal loss in decibels when measured with a notebook.
- Mobile phone: The amount of signal loss in decibels when measured with a mobile phone.

As seen in the Table II the signal is no longer detected by the notebook's measurement software or by the mobile phone from room 314. since rooms 311. 312. 313/315 and 314 are geographically close to room 302. where the 5G signal transmitter is located. Now let's understand how this data can be used to train an Artificial Neural Network (ANN):

a) ANN input: The distance between the router and the measurement point (Router - Point Distance) will be used as the input for the ANN. This means that the ANN will learn the relationship between distance and signal loss.

b) Desired ANN output: The desired ANN output is the predicted signal loss. You can choose to use the measurements made with the notebook (Notebook) or with the mobile phone (Mobile) as the target output for training.

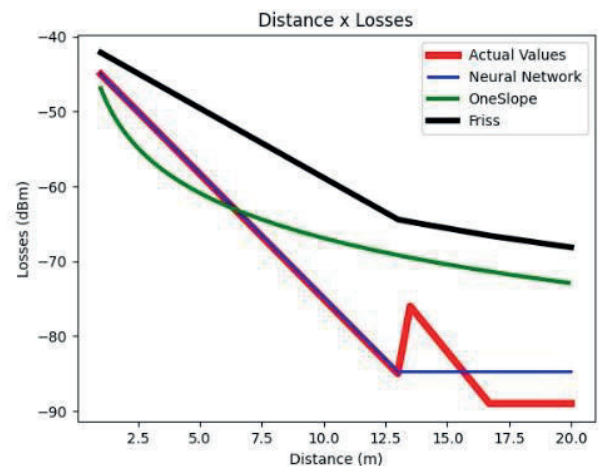
c) Data preparation: The distance will be normalised, making it compatible with the requirements of the ANN. This normalisation ensures that all the inputs are in the same range of values, which helps with training.

d) Creating the ANN: The ANN will be designed with an architecture that includes an input layer (corresponding to the distance), one or more hidden layers and an output layer.

e) Training the ANN: It was trained with the normalised distances as input and the signal losses (Notebook or Mobile) as target output. During training, the ANN will adjust its weights to minimise the error between the predictions and the actual values.

f) Evaluation and Adjustment: Performance is evaluated using error metrics such as the Mean Absolute Error (MAE) or the Mean Squared Error (MSE). calculated with the neural network predictions and the actual losses. Adjustments to the hyperparameters can be made based on these results.

g) Using the trained neural network: After training, the neural network can be used to predict signal losses in new rooms based on the distances between the routers and the measurement points. This is useful for estimating the quality of the 5G signal at different distances.



Mean Neural Network Error: 3.50000002174927
Neural Network Quadratic Error: 22.54999999554664
OneSlope Average Error : 19.478772908747395
OneSlope Quadratic Error: 440.97505160924834

Fig 10 . Losses measured on the 3rd floor.

The Figure 10 shows the values obtained from measurements made on a notebook and a mobile phone to obtain reference values for training the neural network at the same observation point. The neural network is being trained with the values presented and in relation to the reference model.

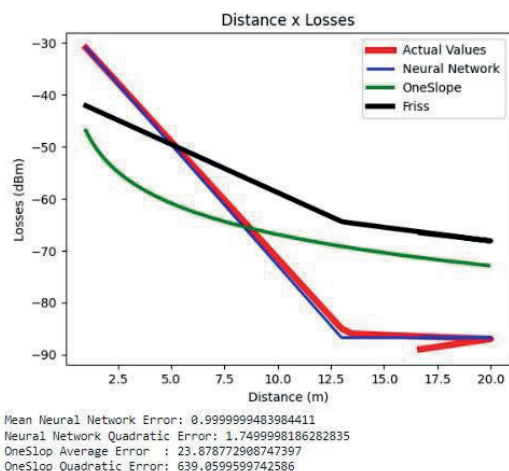


Fig 11 . Losses measured on the 3rd floor.

The Figure 11 shows the values obtained and the convergence of the measurements for the trained neural network. There is a loss of reference for the most distant values.

VI. CONCLUSION

This work developed a tool based on the Python programming language, in the COLAB programming environment, to predict signals in wireless networks in indoor environments, using neural networks as a method of improving the accuracy of predictions. The main focus was on dealing with the challenges of signal propagation indoors, where obstacles, interference and attenuation can cause significant variations in wireless network signals.

The main objective of the project was to face these challenges by combining data obtained through detailed mapping of the indoor environment and real measurements of signal strength. The use of neural networks has demonstrated effectiveness in creating more accurate predictive models compared to traditional approaches. The developed Python tool allowed training and adjusting these models based on the collected information, considering the physical structure of the environment, present obstacles, and construction materials. The results obtained indicated significant improvements in the accuracy of forecasts compared to conventional methods, showing a great potential for the application of the tool in real-world scenarios. This includes planning and optimizing wireless networks in indoor environments, contributing to more stable and reliable connectivity. The project employed the methodology of creating and training an Artificial Neural Network to predict Wi-Fi signal losses, comparing the results of the neural network with field measurements and a traditional analytical model (OneSlope model). Comparison with real measurements and the analytical model revealed the ability of RNA-MLP to overcome the limitations of the traditional model and provide more accurate predictions, especially in scenarios with signal obstructions.

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REFERENCES

- [1] K. Pahlavan and A. H. Levesque, Wireless Information Networks 2th ed., Ed. Wiley, Chichester, England, 2005, page(s): 1 – 4.
- [2] HAYKIN, Simon. Redes Neurais: Princípios e prática. Porto Alegre RS:Bookman, 2001.