SMPTE – NextGen TV Summit
Mobile & Automotive Applications and FEMBMS (5G-Broadcast)

Thomas Janner
Director of Product Management Transmitter Systems
Produced by SMPTE and SBE with support from the NAB and ATSC

and the support of our host, WETA Television
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- ERI®
- harmonic
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- telestream
THANK YOU TO THE SMPTE DC, SBE AND NAB TEAM MEMBERS WHO PRODUCED THIS EVENT

Fred Willard Univision
Rick Singer Singer Media Engineering
Skip Pizzi NAB
Tom Hackett Diversified Systems
Melissa Davis Evertz
Louise Shidler Chesapeake Systems

Maciej Ochman CPB
James Snyder US Library of Congress
Nephi Griffith BMG
Greg Smalfelt Ch 16 Fairfax
Alex Snell BCI Digital
Peter Wharton Happy Robotz

WITHOUT THEIR VOLUNTEER EFFORTS THIS SUMMIT WOULD NOT BE POSSIBLE
**Morning Program**

8:00 AM - 9:00 AM  
Registration and continental breakfast

8:55 AM - 9:00 AM  
Welcome from SMPTE, SBE and AES  
Kishore Persaud, SBE Baltimore  
Fred Willard, SBE Washington

9:05 AM - 9:35 AM  
Introduction  
Peter Wharton, SMPTE Membership VP  
Chris Lane, Chief Engineer, WETA

9:05 AM - 9:35 AM  
NextGen TV: Transforming the Consumer Experience  
Lynn Claudy, SVP Technology, NAB and Chairman, ATSC Board of Directors  
Madeleine Noland, President, ATSC

9:35 AM - 10:00 AM  
Creating New Opportunities with NextGen TV  
Joonyoung Park, VP and Fellow, DigiCAP

10:00 AM - 10:35 AM  
Improved Television Reception for Consumers  
Implementing NextGen TV Distribution Systems  
John Lynch, ERI  
Jeff Andrew, Osborn Engineering

10:35 AM - 11:15 AM  
Benefits of a Converged Broadcast and IP Platform  
Content Reception Enhancements  
Richard Lhermitte, VP Solutions and Market Dev, ENENSYSTeamCast

11:15 AM - 11:30 AM  
Morning Break

11:30 AM - 12:15 PM  
Consumer Applications for Combined 5G & NextGen TV Networks  
Case Study: Hybrid Services at "Chicago 3.0"  
Josh Arensberg, M&E Business Development, Verizon Media  
Jean Macher, Harmonic

12:15 PM - 01:20 PM  
Buffet Lunch

**Afternoon Program**

01:25 PM - 01:45 PM  
Protecting the NextGen TV Consumer  
Advanced EAS and AWARN Capabilities  
John McCoskey, SpectraRep

01:45 PM - 02:15 PM  
Monetizing the NextGen TV Consumer  
Addressable Advertising and Analytics  
Rick Ducey & Mark Fratrik, BIA

02:20 PM - 03:00 PM  
Personalizing the Consumer Experience  
Interactive and Personalized Features  
Mark Corl, Triveni Digital  
Greg Jarvis, Fincons  
So Vang, NAB  
Pete Van Peenan, Pearl TV

03:25 PM - 03:40 PM  
Afternoon Break

03:40 PM - 04:10 PM  
The Consumer Out-of-Home Experience  
Mobile & Automotive Applications and FeMBMS (5G Broadcast)  
Thomas Janner, Product Management & R&D Director, Rhode & Schwarz

04:10 PM - 04:35 PM  
The ATSC 3.0 Roadmap  
Lynn Claudy, SVP Technology, NAB and Chairman, ATSC Board of Directors  
Madeleine Noland, President, ATSC

04:35 PM - 05:00 PM  
The Consumer Technology Roadmap  
Brian Markwalter, SVP Research and Standards  
The Consumer Technology Association

05:00 PM - 06:00 PM  
Station Group and Industry Deployment Plans  
Advanced Capability Implementation Strategies  
Skip Pizzi, VP Technology Education & Outreach, NAB (Moderator)  
Michael Bouchard, VP Technology Strategy, ONE Media / Sinclair  
Stacey Decker, CTO, Public Media Group  
Sasha Javid, COO, The Spectrum Co

06:00 PM - 08:00 PM  
Cocktail Reception  
Busboys and Poets  
4251 S. Campbell Ave., Shirlington  
Heavy Hors d’oeuvres and open bar
MOBILE COMMUNICATIONS

- Voice & Video Calls
- Social Media
- Live Streaming
- Linear content
- Video on demand
- E-commerce
- File transfer
- Online gaming
CURRENT SITUATION OF BROADCASTING INDUSTRY

► Consumer behavior changes
  – Streaming services are competing with linear TV
  – Smartphones/Tablets more and more important

► No access to smartphones
  – No support of Broadcast standards by most Smartphones

How to get access to Smartphones & Mobile devices?
Exponential increase of Mobile Video including Live events & Linear TV

Smartphone users desire to consume HD videos anytime – anywhere

UHD/4K smartphones now available → rising demand for 4K video quality

Heavy investments … But what about QoS / QoE?
## POTENTIAL OF (5G-) BROADCAST

- Large-scale HPHT network
- Nation wide coverage
- New Business models
- Very low latency
- Cost & Spectrum Efficiency
- Higher QoS, Better QoE

### Mobile streaming
- Live TV and Live streaming (e.g. sport events)
- Data offloading

### Automotive
- Autonomous driving information
- Software & firmware updates
- Signage information

### Internet of things
- Software & firmware updates
- Common control messages to devices

### Public safety
- Disaster alerts (e.g. tsunami, earthquake)
- Emergency alerts (e.g. hazard, amber alert)
TODAY’S REALITY
USING BROADCAST FOR NETWORK ENHANCEMENTS

Broadcast will improve data traffic efficiency
AUTOMOTIVE – A “NEW” PLAYER IN THE BROADCAST & CELLULAR WORLD
USING BROADCAST IN AUTOMOTIVE APPLICATIONS

Data Offloading for common data

Traffic updates on local area
+ Emergency warning system

Image source: Tesla
TV AND MOBILE EVOLUTION: CONVERGING TECHNOLOGIES


ATV

ATSC1.0

DVB-H

MediaFLO

ATSC3.0

Broadcast

Mobile

GSM (2G)

UMTS (3G)

LTE (4G)

5G / NR

FeMBMS

5G Broadcast

MBMS / eMBMS

Rohde & Schwarz
FEMBMS

- **Further Enhanced** Multimedia Broadcast/Multicast Service

- **Definition as MBMS in UMTS** (Release 5/6) and Re-appearance with LTE Release 8 as **eMBMS**

- **Known as LTE enTV** (enhanced TV) in 3GPP Release 14

- **Broadcast/Multicast** Premium content anywhere/anytime
ENHANCING SYSTEM ARCHITECTURE & MEDIA FORMATS

► Receive-Only Mode (ROM) for devices

► Free-to-air content broadcast

► Simplified Architecture

► UHD, HDR & 4K Full Support

► Transport-only (pass-through) FeMBMS bearer to use the network as content delivery platform
FEMBMS : HPHT SIMPLIFIED ARCHITECTURE

Core Network

Access Network

Content Provider

Internet

xBM User Plane

xBM Control Plane

xBM Interface

Transparent Delivery

BM-SC

FeMBMS / MooD

eNB

eNB

eNB
FeMBMS was specified in 3GPP Release 14 in the summer of 2017

→ *Consideration of media broadcasters’ perspective*
  - Support of larger inter-site distance (cyclic prefix 200 µs)
  - Dedicated MBMS transmission (100% broadcast transmission)
  - Receive-only mode
  - Numerology that fit into LTE/5G NR numerology => single chipset
  - Cellular network independent signalling and SIM card free operation

<table>
<thead>
<tr>
<th>MCS Index</th>
<th>BW = 5MHz</th>
<th>BW = 10MHz</th>
<th>BW = 15MHz</th>
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<td>30.81 Mbps</td>
<td>46.22 Mbps</td>
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</tbody>
</table>
PROJECT: 5G TODAY, GERMANY
FEMBMS HPHT FIELD TRIAL

- Research and implementation of the FeMBMS specification for the large-scale transmission of media content in broadcast mode based on mobile technology
- Funded by the Bavarian Research Foundation
- Duration 28 months (1st of July 2017 to 31st October 2019)

Project partners:

IRT    KATHREIN    ROHDE & SCHWARZ

Associated partners:

BR    Telefónica    O₂
5G TODAY
CURRENT STATUS

► Frequency: 750 – 758 MHz
► Bandwidth: 5MHz (later 10MHz)

► Two transmitter sites:
  – Wendelstein
  – Ismaning
  – Inter-site distance 64km

► Equipment installed:
  – THU9evo 5kW (Wendelstein)
  – THU9evo 6kW (Ismaning)
  – Approx. 100kW ERP each

Source: Google Maps

Rohde & Schwarz
5G BROADCAST IN SFN MODE
And since August 2019: 5G Broadcast is on air in Beijing!
OTHER TRIALS?
R&S VISION: EFFICIENT DISTRIBUTION OF MOBILE TV

► R&S Solution:
Utilization of Broadcast/Multicast concepts
- Broadcast/Multicast together with unicast
- Large-scale cells
- High Power High Tower (HPHT)
- Frequencies < 1 GHz

► It’s all about efficiency
Efficient spectrum use by Multicast data distribution just once

→ Increase of profitability