PERSONALIZING THE CONSUMER EXPERIENCE
INTERACTIVE AND PERSONALIZED FEATURES

MARK CORL, TRIVENI DIGITAL
GREG JARVIS, FINCONS
SO VANG, NAB
PETE VAN PEENAN, PEARL TV
NGTV Application Framework

SMPTE Next Gen TV Conference
January 16, 2020
Produced by SMPTE and SBE with support from the NAB and ATSC

and the support of our host, WETA Television
Event Recording courtesy of the following sponsors:

- nextgenTV Summit
- telestream
- Panasonic
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THANK YOU TO THE SMPTE DC, SBE AND NAB TEAM MEMBERS WHO PRODUCED THIS EVENT

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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
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM - 9:00 AM</td>
<td>Registration and continental breakfast</td>
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<tr>
<td>8:55 AM - 9:00 AM</td>
<td>Welcome from SMPTE, SBE and AES</td>
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<tr>
<td></td>
<td>Kishore Persaud, SBE Baltimore</td>
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<td>Fred Willard, SBE Washington</td>
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<tr>
<td>9:00 AM - 9:05 AM</td>
<td>Introduction</td>
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<tr>
<td></td>
<td>Peter Wharton, SMPTE Membership VP</td>
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<td></td>
<td>Chris Lane, Chief Engineer, WETA</td>
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<tr>
<td>9:05 AM - 9:35 AM</td>
<td>NextGen TV: Transforming the Consumer Experience</td>
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<td></td>
<td>Lynn Claudy, SVP Technology, NAB and Chairman, ATSC Board of Directors</td>
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<tr>
<td></td>
<td>Madeleine Noland, President, ATSC</td>
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<tr>
<td>9:35 AM - 10:00 AM</td>
<td>Creating New Opportunities with NextGen TV</td>
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<td>Joonyoung Park, VP and Fellow, DigiCAP</td>
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<tr>
<td>10:00 AM - 10:35 AM</td>
<td>Improved Television Reception for Consumers</td>
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<td>Implementing NextGen TV Distribution Systems</td>
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<td>John Lynch, ERI</td>
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<td>Jeff Andrew, Osborn Engineering</td>
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<td>10:35 AM - 11:15 AM</td>
<td>Benefits of a Converged Broadcast and IP Platform</td>
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<td>Lynn Claudy, SVP Technology, NAB and Chairman, ATSC Board of Directors</td>
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<tr>
<td>11:15 AM - 11:30 AM</td>
<td>Morning Break</td>
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<tr>
<td>11:30 AM - 11:50 AM</td>
<td>Consumer Applications for Combined 5G &amp; NextGen TV Networks</td>
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<td>Josh Arensberg, M&amp;E Business Development, Verizon Media</td>
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<tr>
<td>11:50 AM - 12:15 PM</td>
<td>Case Study: Hybrid Services at &quot;Chicago 3.0&quot;</td>
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<td>Jean Macher, Harmonic</td>
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<td>12:15 PM - 01:20 PM</td>
<td>Buffet Lunch</td>
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<td>1:25 PM - 01:45 PM</td>
<td>Protecting the NextGen TV Consumer</td>
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<td>Advanced EAS and AWARN Capabilities</td>
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<td>John McCoskey, SpectraRep</td>
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<td>01:45 PM - 02:15 PM</td>
<td>Monetizing the NextGen TV Consumer</td>
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<td>Addressable Advertising and Analytics</td>
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<td>Rick Ducey &amp; Mark Fratnik, BIA</td>
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<td>02:20 PM - 03:20 PM</td>
<td>Personalizing the Consumer Experience</td>
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<td>Interactive and Personalized Features</td>
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<td>Mark Cori, Triveni Digital</td>
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<td>Greg Jarvis, Fincons</td>
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<td>So Vang, NAB</td>
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<td>Pete Van Peenan, Pearl TV</td>
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<td>03:25 PM - 03:40 PM</td>
<td>Afternoon Break</td>
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<tr>
<td>03:40 PM - 04:10 PM</td>
<td>Mobile &amp; Automotive Applications and FeMBMS (5G Broadcast)</td>
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<td>Thomas Janner, Product Management &amp; R&amp;D Director, Rhode &amp; Schwarz</td>
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<tr>
<td>4:10 PM - 4:35 PM</td>
<td>The ATSC 3.0 Roadmap</td>
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<td>Lynn Claudy, SVP Technology, NAB and Chairman, ATSC Board of Directors</td>
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<td>Madeleine Noland, President, ATSC</td>
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<tr>
<td>4:35 PM - 5:00 PM</td>
<td>The Consumer Technology Roadmap</td>
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<td>Brian Markwalter, SVP Research and Standards</td>
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<td>The Consumer Technology Association</td>
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<td>5:00 PM - 6:00 PM</td>
<td>Station Group and Industry Deployment Plans</td>
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<td>Advanced Capability Implementation Strategies</td>
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<tr>
<td></td>
<td>Skip Pizzi, VP Technology Education &amp; Outreach, NAB (Moderator)</td>
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<td></td>
<td>Michael Bouchard, VP Technology Strategy, ONE Media / Sinclair</td>
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<td>Stacey Decker, CTO, Public Media Group</td>
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<td>Sasha Javid, COO, The Spectrum Co</td>
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<td>6:00 PM - 8:00 PM</td>
<td>Cocktail Reception</td>
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<td>Busboys and Poets</td>
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<td>4251 S. Campbell Ave., Shirlington</td>
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<tr>
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<td>Heavy Hors d’oeuvres and open bar</td>
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Who is Pearl?

A business organization of U.S. broadcasters with a shared interest in promoting local broadcast TV content and in developing media and wireless platforms.
Phoenix – ATSC 3.0 Model Markert

Open, collaborative testbed
Developing basic TV service
Testing consumer propositions
Testing cable integration
Developing industry frameworks for station transition and service delivery
Phoenix Model Market - Broadcasters

- E.W. Scripps Company’s KNXV Channel 15 (ABC)
- Fox Television Stations’ KSAZ Channel 10 (FOX)
- KUTP Channel 26 (MyTV Network)
- Meredith Local Media Group’s KPHO Channel 17 (CBS)
- KTVK Channel 24 (Independent)
- Nexstar Media Group’s KASW Channel 49 (CW Network)
- Telemundo Station Group’s KTAZ Channel 39 (Telemundo)
- Tegna’s KPNX Channel 12 (NBC)
- Univision’s KFPH-CD Channel 35 (UniMas)
- KTVW-DT Channel 33 (Univision)
- Arizona Television, KAZT Channel 7
- Arizona PBS – KAET Channel 8
Growing ecosystem

- Open NGTV testbed
- TV manufacturers
- Technology vendors
- Consumer testing
- Transmission testing
Application and Framework Overview
Broadcaster Goals – Application Framework

- Consistency in navigation and behavior
  - Avoid confusion/conflicting user experiences
- Enable innovation
  - Develop new kinds of value-added experiences
  - Test consumer value propositions
- Minimize CE device test burden
- Minimize development and support costs
Common Consumer Application

Common Component Framework

ATSC 3.0 Receiver

Common UI

Broadcast applications

Security & Protection
Content Replacement
Identity & privacy management
Addressable & Audience Data
Application management
Guide data access, normalization
Resource management
Startover service

APIs
Storage
Audio & Video
Runtime & media player
Watermark extraction
Security & Protection

Application Cloud Services

Program information
OTT A/V delivery
Application content
Application management
Security & Protection
Ad delivery

Illustrative software stack
Common Application & Framework Features

**Common Application**
- First Time User Experience
- Call-to-action notification
- Home screen menu
  - Broadcaster logo / style
  - Channel and local time display
  - App language selection
  - Watching / on next
  - CC on/off indicator
- Consumer interactive features (by broadcaster)
  - Weather widget
  - VOD clips
  - Alerting Display
  - Polling, Voting

**Framework**
- Lifecycle management
- Content Protection handling
- Message handling
- Remote control navigation
- Application instrumentation
- Authentication
- Alerting controls
- Language, rating detection
- Streaming playback controls
- Identity management
- Privacy controls
- Receiver API integration
- Connectivity & resource management
- Video controls
Ancillary Components and services

- Receiver Emulator
- API Tester (unit test module)
- Starter Home Screen & basic apps, widgets
- Conversion tools (MRSS to JSON, other)
- Common terms of service and privacy protections
- Onboarding, workshops
- Zoo testing
Operational Considerations

- IP Infrastructure
- CMS, automation/playout system integration
- Application Servers
- Origin server(s) for VOD clips, segments
  - Prime screen formatting (10’ viewing)
- Ad decisioning and serving
- Service and Content Protection
- Service Monitoring
Thank You
FROM THE SMPTE WASHINGTON DC SECTION

THANK YOU