ATSC 3.0/NEXTGEN TV

Chapter 40, San Francisco

Fred Engel, CPBE ATSC 3
Fred Engel Technology Consulting, LLC

September 15, 2024

WATCH: Historic flooding in Asheville, North Carolina's Biltmore Village

Credit: https://www.usatoday.com/videos/news/weather/**2024/09/28**/asheville-nc-flooding-biltmore-village-underwater-after-helene/75432336007/

Hi, I'm Fred.

I help broadcasters chart their technological future.

As a career broadcaster with extensive strategic planning experience, I can assist you in this fast-changing world. My work in the NEXTGEN TV/ATSC 3.0 space is widely recognized both domestically and abroad.

I have had multiple papers published in engineering journals, received numerous awards, and spoken at dozens of conferences on a variety of television

www.fredengelconsulting.com
fred@fredengelconsulting.com

FE | Fred Engel
TC | Technology Consulting LLC

2013 KET
Live Broadcast with
International Space Station

2017
NAB Pilot
Innovation Challenge
Winner

2007-09 ROSCOR
Corp. VP Broadcast

2004 Midwest Emmy
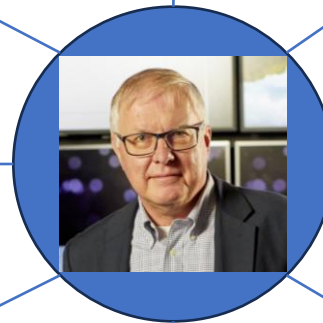WTTW/Chicago
Digital Broadcast
Operation Center

2022
Best Television Paper
NAB and IEEE BMSB

1978 WTTW/Chicago
Stereo Audio for TV

2023
NAB Product
Innovation Award

2024 Fred Engel
Technology Consulting

Access my published papers! ⌄

Public Safety Datacast Paging 🔗
Authored with Red Grasso, NCDIT; Allan Sadowski (retired) FirstNetNC; Adam Woodlief, Georgia Public Broadcasting

ATSC 3.0 and Public Broadcasting: A Whitepaper Supporting Public Broadcasters' Efforts in ATSC 3.0/NEXTGEN TV 🔗

The Educational Broadband Gap: A Whitepaper on Utilizing ATSC 3.0/NEXTGEN TV to Address Remote Learning Needs 🔗

ATSC 3.0 as a Use Case for Public Safety Communications – Development Milestones (NAB 2022 Best Paper) 🔗
Authored with Red Grasso, NCDIT, Chris Lamb, and Tony Sammarco, Device Solutions, Inc.

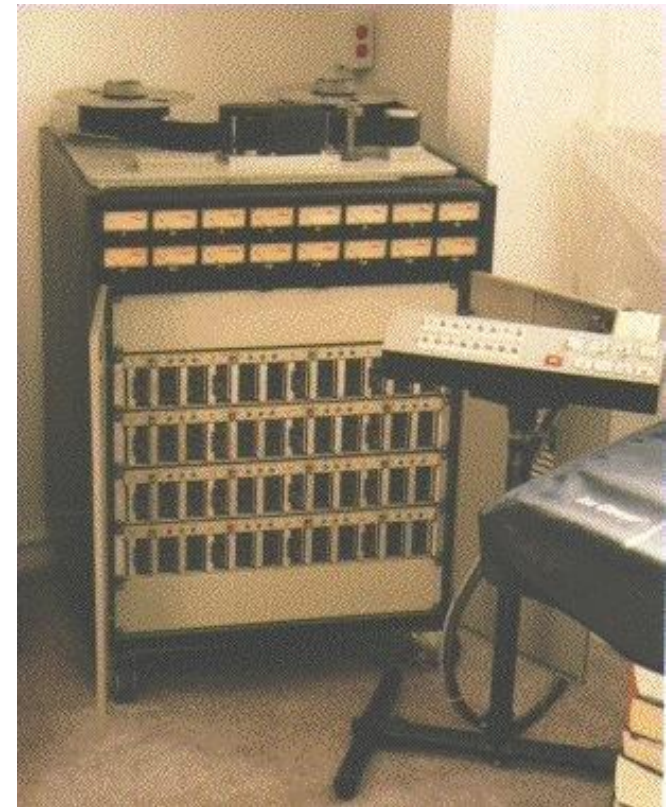### ATSC 3.0 as a Use Case for Public Safety Communications (IEEE BSMB 2022, Bilbao, Spain) 🔗
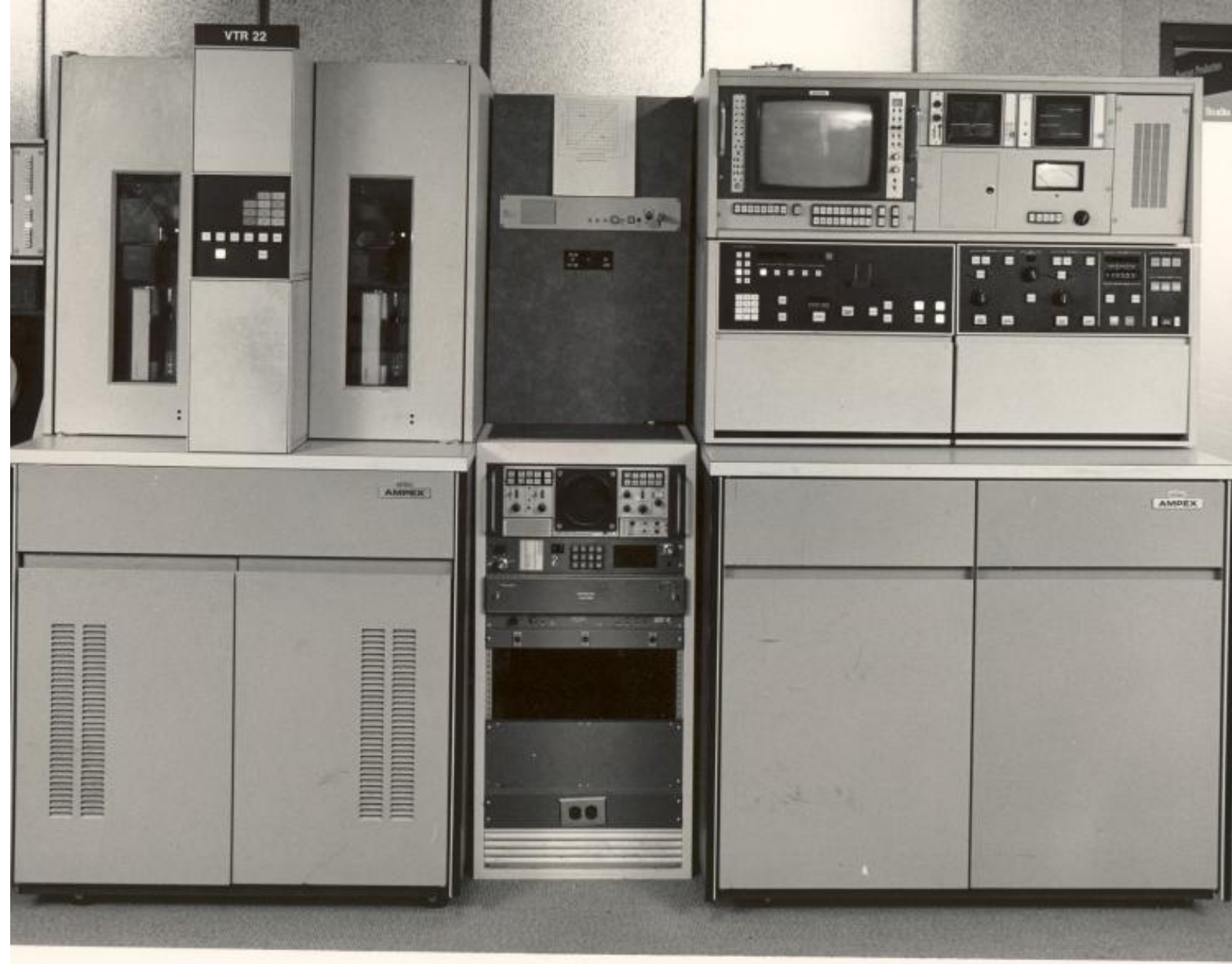Authored with Red Grasso, NCDIT, and Chris Lamb, Device Solutions, Inc.

ATSC 3.0 and Public Broadcasting, a Case for Flash Cut 🔗
Authored with Don Smith, PBS North Carolina, and Bill Hayes (retired), Iowa PBS

ATSC 3.0 and Wireless Emergency Alerting -a Great Match 🔗
Authored with Chris Lamb, Device Solutions, Inc.

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ATSC

The Broadcast
Standards
Association

ABOUT ATSC

The Advanced Television Systems Committee, Inc. is an international, non-profit organization developing voluntary standards for digital television. The ATSC member organizations represent the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries. We are defining the future of television with the ATSC 3.0 next-generation broadcast standard.

OUR MISSION

To create and foster implementation of voluntary Standards and Recommended Practices to advance terrestrial digital television broadcasting, and to facilitate interoperability with other media.

Chartered in 1982

ATSC The Broadcast Standards Association

ATSC Leadership

President: Madeleine Noland
Chair: John Taylor, SVP LG Electronics USA
Vice Chair: Brian Markwalter, SVP, Research and Standards, CTA
Treasurer: Lynn Claudy, SVP, Technology, NAB

Directors:
- Richard Friedel, Consultant, Pearl TV
- Yiyan Wu, Research Professor, Western University / IEEE
- Rikin Thakker, CTO & SVP, Technology, NCTA
- Anne Schelle, Managing Director, Pearl TV
- **Paul Hearty, Chief Standards Strategist, Samsung Research America**
- Kerry Oslund, VP, AI Strategy, E. W Scripps Company
- Mark Aitken, SVP, Sinclair
- Zandra Clarke, Transmission Specialist III, WarnerBros.Discovery / SMPTE
- Adam Goldberg, Director, Technical Standards, Sony Electronics
- Ling Ling Sun, Chief Technology Officer, Nebraska ETV
- Ed Czarnecki, VP Global and Government Affairs, Digital Alert Systems, Inc.
- Fred Engel, Principal, Fred Engel Technology Consulting LLC

ATSC The Broadcast Standards Association

Technology Group 3

The ATSC Technology Group 3 (TG3), develops and maintains voluntary, international technical Standards, Recommended Practices and other documents for the distribution of television programs and other data using advanced terrestrial broadcast technology, internet and other transports. Chair: Dr. Paul Hearty, Samsung

TG3 Specialist Groups

TG3/S31: System Requirements and Program Management

TG3/S32: Specialist Group on Physical Layer for ATSC 3.0

TG3/S33: Specialist Group on Management and Protocols

TG3/S34: Specialist Group on Applications and Presentation for ATSC 3.0

TG3/S36: Specialist Group on ATSC 3.0 Security

TG3/S37: Specialist Group on Conversion and Redistribution of ATSC 3.0 Service

TG3/S38: Specialist Group on Interactive Environment

TG3/S39: Specialist Group on ATSC 1.0

TG3/S41 Specialist Group on Video for ATSC 3.0

TG3/S42 Specialist Group on Audio for ATSC 3.0 (TG3/S42)

TG3/S43, Specialist Group on ATSC 3.0 Core Network

TG3-6: AHG on DASH-IF

TG3-9: AHG on Interlayer Communications in the ATSC 3.0 Ecosystem

TG3-10: AHG on Emergency Alerts

TG3-11, AHG on ATSC 3.0 - 5G Harmonization

TG3-12, AHG on Portrait Mode and Multiple Video

TG3-13, AHG on NPP N-068 Phase 2

ATSC The Broadcast Standards Association

IMPLEMENTATION TEAMS

Implementation Teams are formed to provide a venue for industry discussions related to implementation of ATSC Standards. I-Teams may address business, regulatory and technical requirements for successful roll-out of ATSC Standards. I-Teams do not draft Standards or Recommended Practices; however, they may create Implementation Guides.

- Implementation Team 1 – Advanced Emergency Information
- Implementation Team 2 – India
- Implementation Team 3 – ATSC 3.0 Conformance
- Implementation Team 4 – Brazil
- Implementation Team 5 – Tower Network
- Implementation Team 7 – Caribbean
- Implementation Team 8 – Automotive

ATSC The Broadcast Standards Association

PLANNING TEAMS

Planning Teams are groups designed to study a given topic, often prior to ATSC starting any technical effort. Planning Teams are formed by and report to the ATSC Board of Directors. Open to all ATSC members, Planning Teams are free to explore a range of facets behind a topic including industry impact, technical viability, technology maturity, and more.

- Planning Team 4 – Future Broadcast Ecosystem Technologies
- Planning Team 5 – Automotive Applications
- Planning Team 6 – Global Recognition of ATSC 3.0
- Planning Team 9 – Sustainability

ATSC The Broadcast Standards Association

EXPERT GROUPS

Expert Groups (EG) are formed to facilitate ongoing work with other Standards Development Organizations (SDOs). These groups report to the Liaison Group, which manages communications to and from other SDOs. There are currently three EGs, as listed below.

- ATSC Expert Group on 3GP
- ATSC Expert Group on ITU
- ATSC Expert Expert Group on TSDSI

MEMBERS

ATSC is a membership organization with both voting and observer classes. Voting members include corporations, nonprofit organizations, and government entities, and they participate actively in the work of ATSC. Observers are individuals or entities not eligible to be a voting member.

BECOME A MEMBER »

Approximately 150 worldwide members

ATSC Membership Dues

There are five categories of ATSC Membership Dues, each based on an organization's annual revenue. Dues are invoiced annually, and if a member joins mid-year then the dues are pro-rated quarterly. For more details, see the ATSC Dues Policy. The table below represents the current dues structure.

Annual Gross Revenue	Annual Member Dues	Annual Observer Dues
Individual	N/A	$750
Colleges and Universities	$2,800	$2,100
Less than $10 million US	$2,800	$2,100
$10 million – $100 million US	$9,500	$7,800
$100 million – $1 billion US	$20,000	$18,500
More than 1 billion US	$28,000	$20,000

ATSC The Broadcast Standards Association

NEXTGEN TV //
PBS NC NEXTGEN TV Coverage Area

WNGT-CD
SELMA/SMITHFIELD, NC

WUNK-TV
GREENVILLE, NC

PBS NORTH CAROLINA // NC DEPARTMENT OF INFORMATION TECHNOLOGY
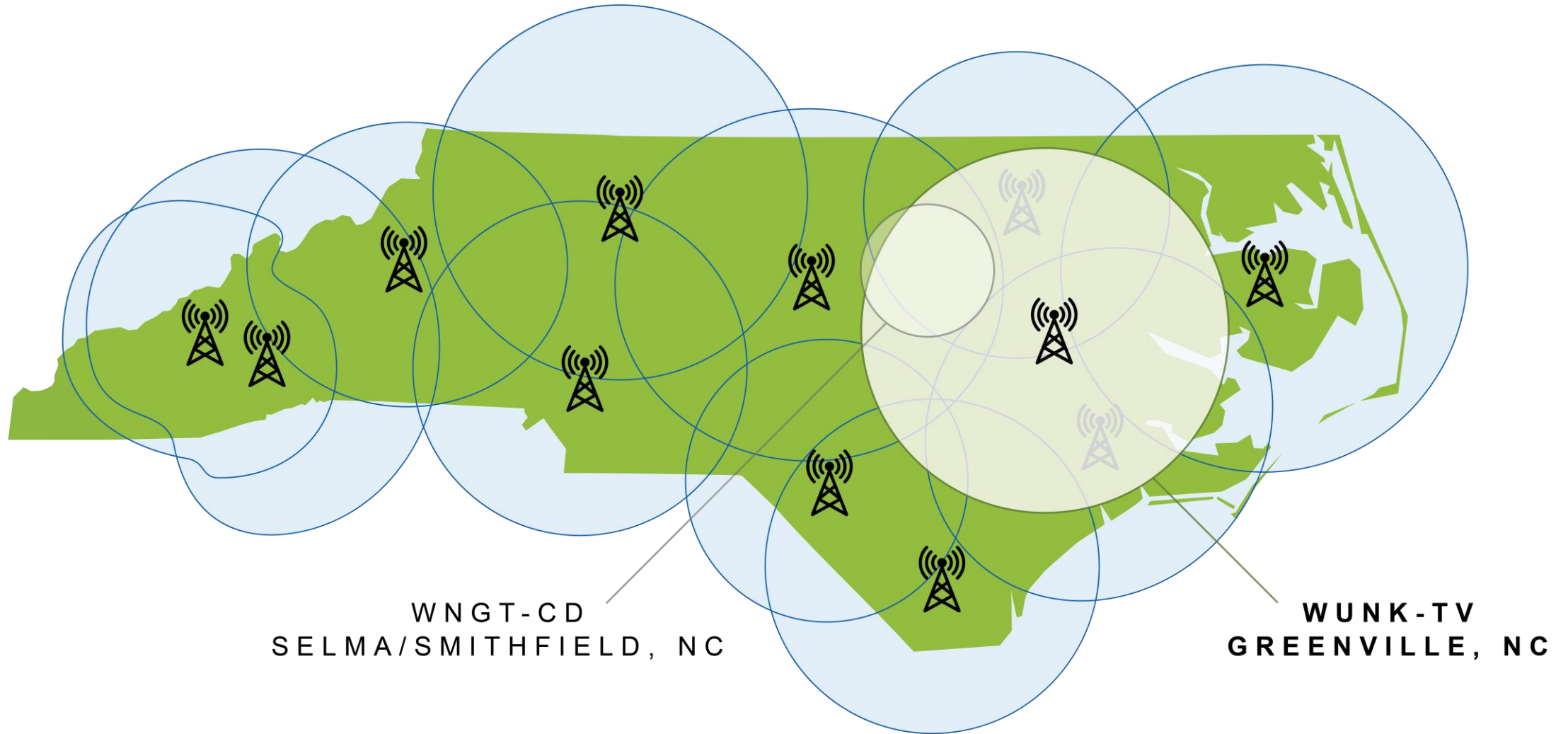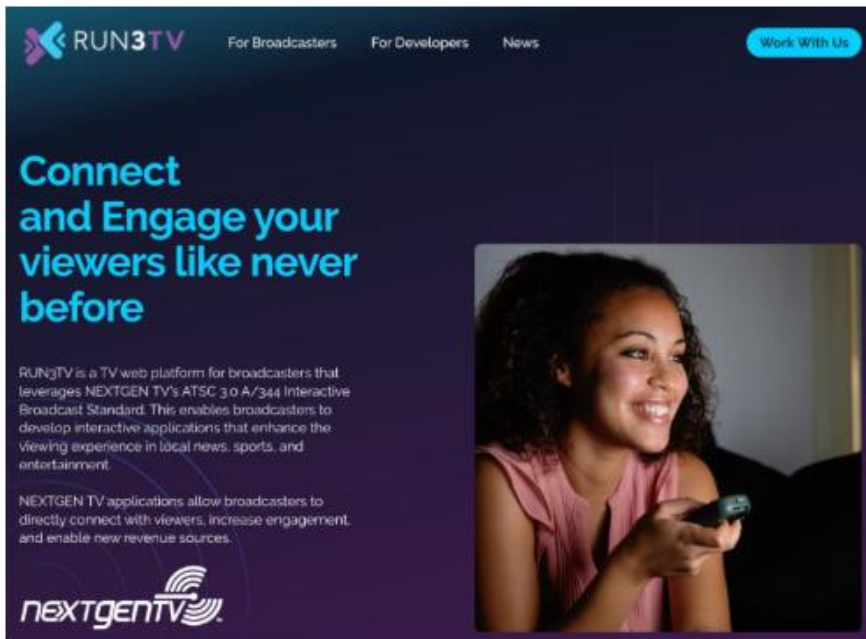
Why ATSC 3.0 NextGen TV?

- Better Video & Audio Quality

- Better Reception

- Interactivity – Broadcast Application

- Advanced Emergency Information

- Remote / Extended Education

- Emergency Responder Dispatch Paging

- Precision Time and Location

- Reading Service for Visually Impaired

ATSC 3.0 – Broadcast Application

RUN3TV

RUN3TV is a TV web platform for broadcasters that leverages NEXTGEN TV's ATSC 3.0 A/344 Interactive Broadcast Standard. This enables broadcasters to develop interactive applications that enhance the viewing experience in local news, sports, and entertainment.

Learn More

INFORMATION EQUITY INITIATIVE

Student
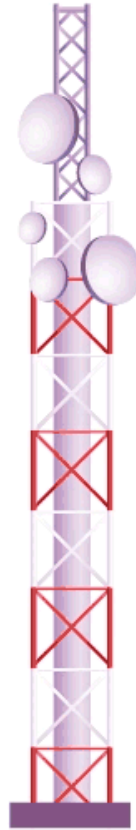
Teacher

IEI datacasting allows curators to select content and send customized digital files to individuals *at the click of a button* anywhere television signals can reach.

IEI was designed by educators and integrates seamlessly with Learning Management Systems like Google Classroom, Schoology and Canvas.

NORTH CAROLINA READING SERVICE

ATSC 1.0 to ATSC 3.0 Explainer Slides

What is Datacasting?

- Unused bandwidth for other needs

- Sending one-way data using the existing TV transmission

- Data can include text, video, audio, files, etc.

Current Kitchen Fire Dispatch

- 🔊 5 tones to 9 units – 26 seconds

- 🔊 Voice announcement *only after* all pager tones

- 🔊 11 seconds to read unit numbers

- 🔊 Location announced 42 seconds after alert initiated

- 🔊 Full alert = ~67 seconds

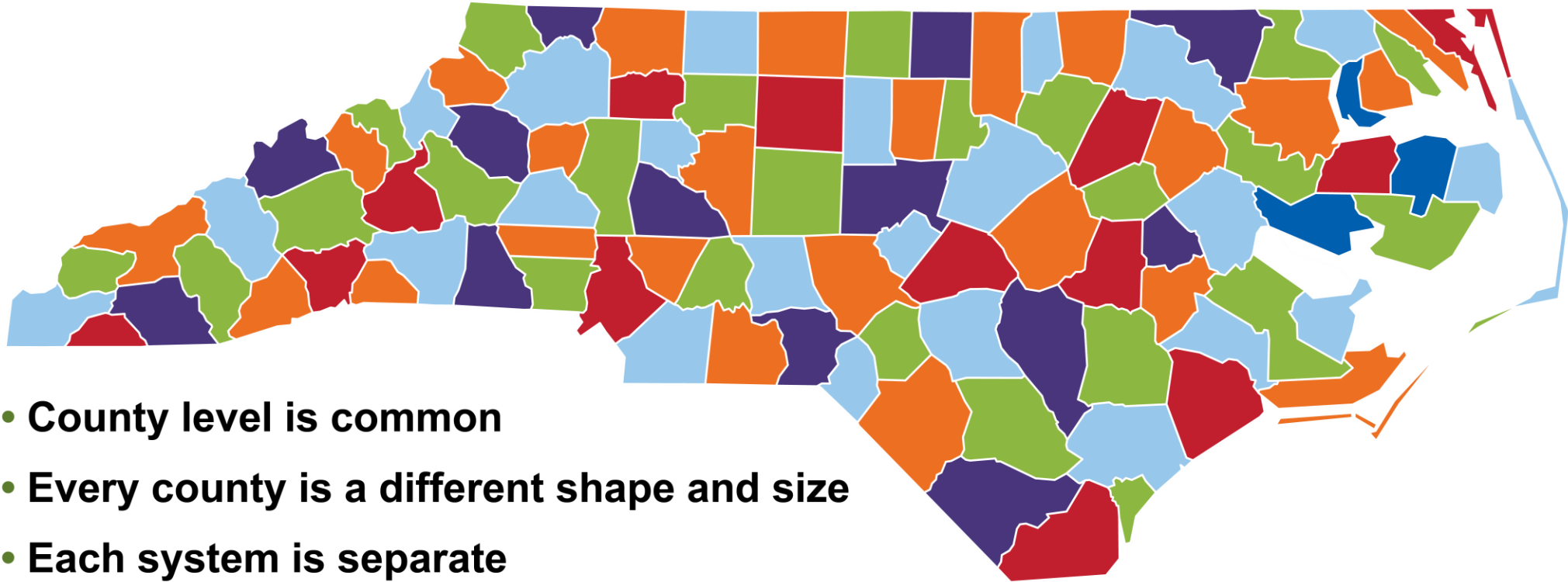| 4034 | 4024 | 4125 | 4114 | 3735 | 3720 | 4027 | 4002 | 4102 |

Tone Alerting and Analog Pagers

- Technology from 50+ years ago

- 70% of firefights are volunteers

- Volunteers might not be located at the fire station

- Tone & Voice Pager

- Extremely reliable & durable

- Most have no display, voice only

- Listen to on-scene radio traffic

- ISO concerns

Coverage Designed for the Response Area

- **County level is common**
- **Every county is a different shape and size**
- **Each system is separate**

Datacast Paging Benefits

- High Tower & High Power

- Infrastructure already exists

- Instantaneous

- Encrypted

- Scalable bandwidth

- Simultaneous dispatches

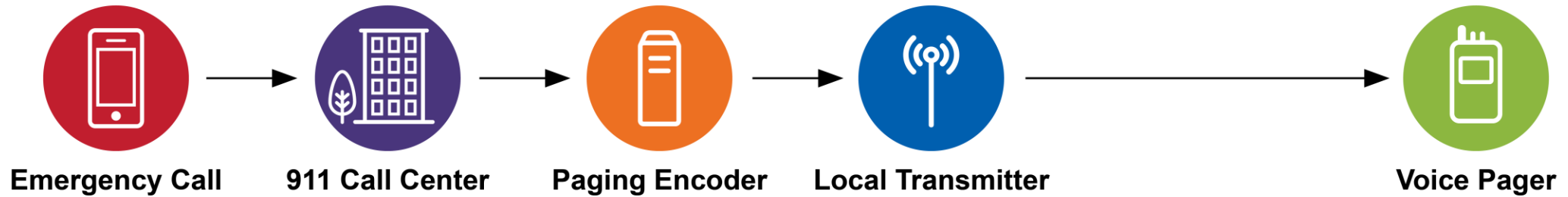- Maps, preplans, ICS forms, audio, video

- Device is always aware of coverage

ATSC 3.0 Kitchen Fire Dispatch

- 🔊 Full alert ≈ 1 second
- 🔊 All information delivered as text
- 🔊 On-board text-to-speech

4034 4024 4125 4114 3735 3720 4027 4002 4102

Existing Emergency Paging Ecosystem

Emergency Call → **911 Call Center** → **Paging Encoder** → **Local Transmitter** → **Voice Pager**

Existing Emergency Paging + Cellular

Emergency Call → 911 Call Center → Paging Encoder → Local Transmitter → Voice Pager

911 Call Center → Data Normalization Server → 3rd Party App Server → Cellular → Cell Phone

NEXTGEN TV //
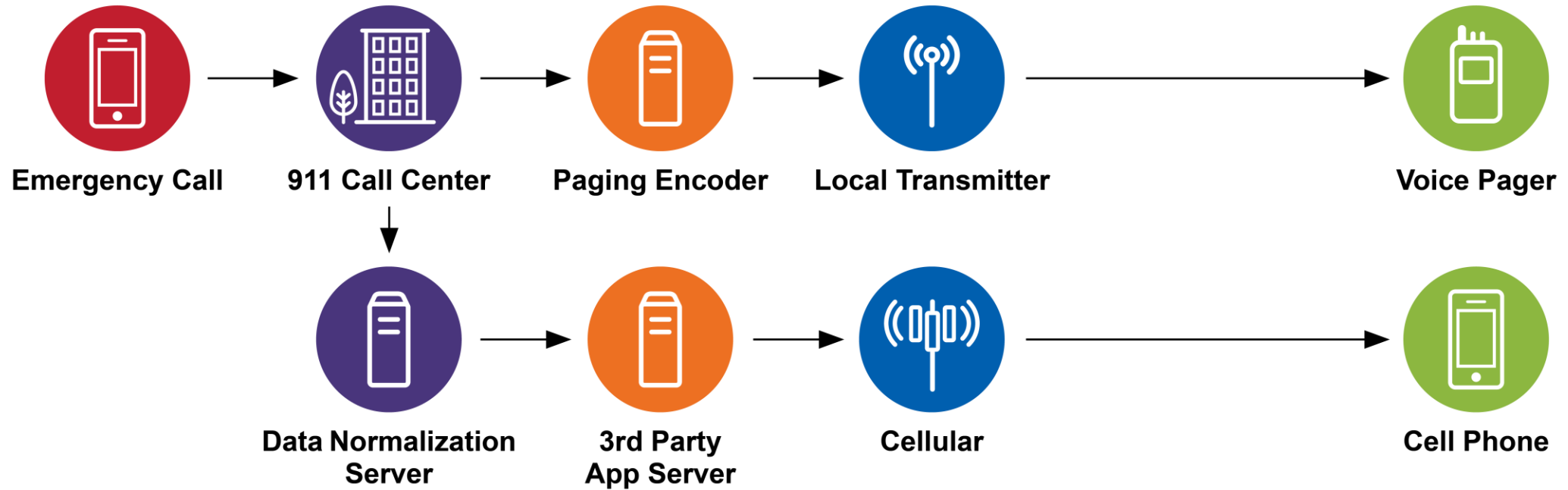
ATSC 3.0 Standalone Paging Ecosystem

Emergency Call → 911 Call Center → Paging Encoder → Local Transmitter → Voice Pager

911 Call Center → Data Normalization Server → 3rd Party App Server → Cellular → Cell Phone

Data Normalization Server → ATSC 3.0 Signaling Server → ATSC 3.0 TV Broadcast → ATSC 3.0 Pager
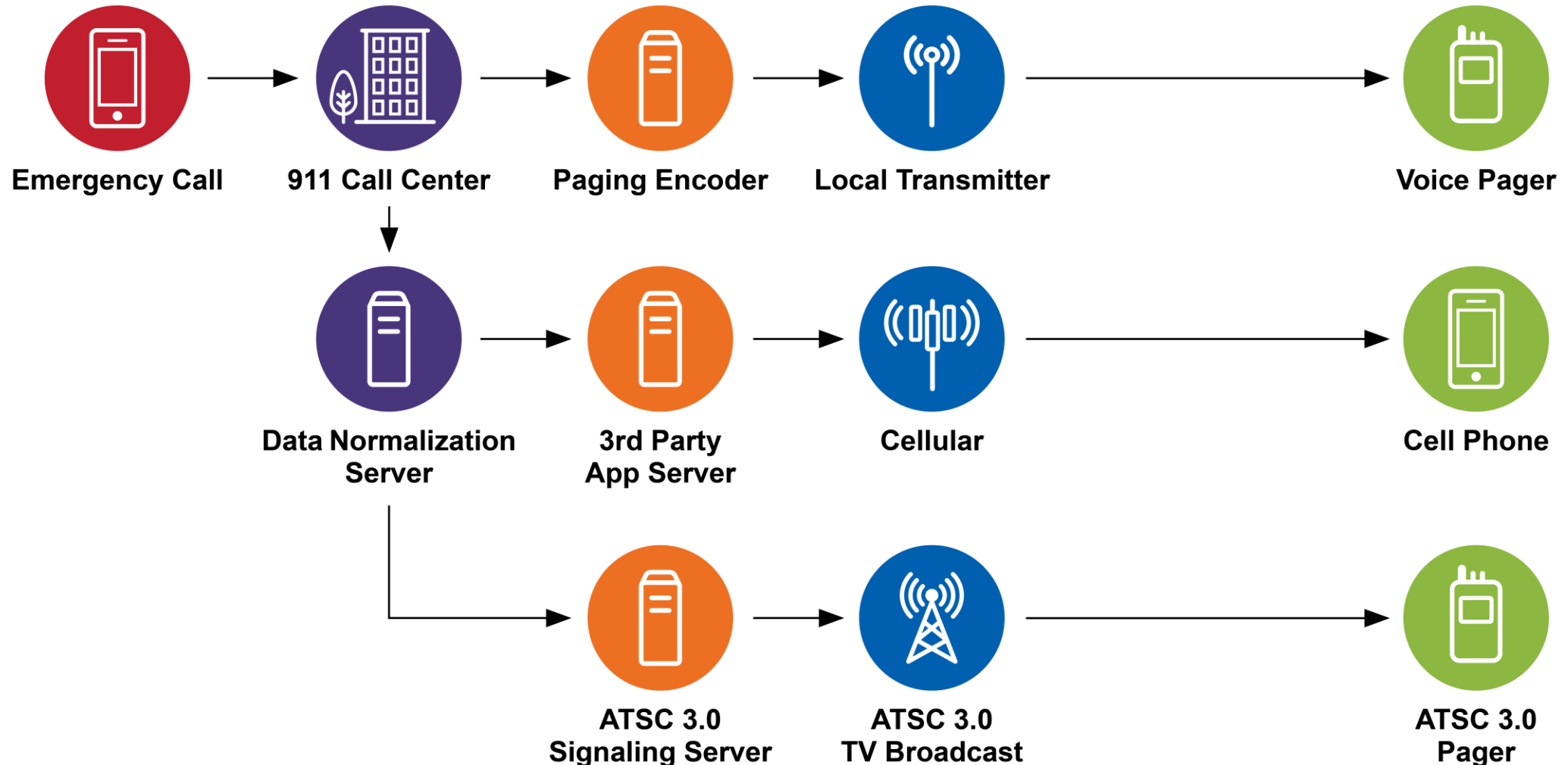
ATSC 3.0 Companion Device Paging Ecosystem

Emergency Call → 911 Call Center → Paging Encoder → Local Transmitter → Voice Pager

911 Call Center → Data Normalization Server

Data Normalization Server → 3rd Party App Server → Cellular → Cell Phone

Data Normalization Server → ATSC 3.0 Signaling Server → ATSC 3.0 TV Broadcast → Companion Paging Receiver → Cell Phone
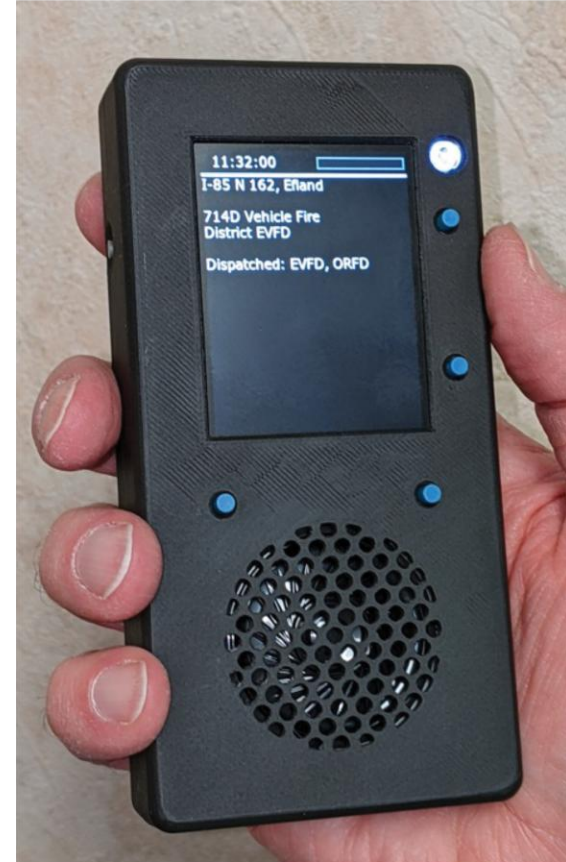
ATSC 3.0 TV Broadcast → ATSC 3.0 Pager
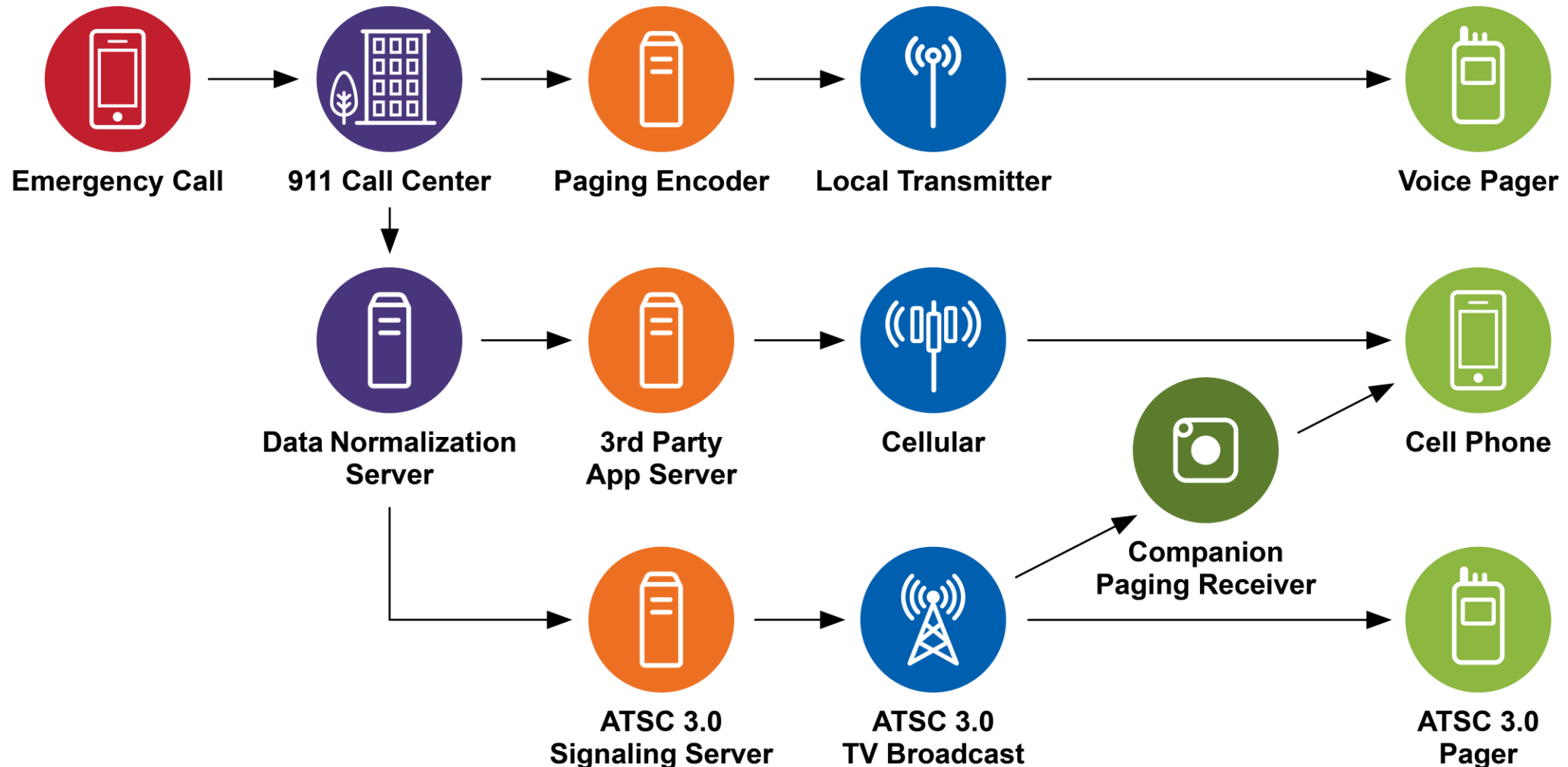
ATSC 3.0 Pager Prototype

- DHS funded a prototype pager

- PBS North Carolina worked with Device Solutions

- Real call information was routed from the PSAP to responders

NEXTGEN Incident Response Communication System - Using ATSC 3.0

+ Add to myNAB Show

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🕒 Saturday, April 5 | 3:40 PM - 4:00 PM PDT

📍 W220-W221

Pass Required: All Access Pass , Premium Conference Pass

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Datacasting over ATSC 3.0/NextGen TV offers a variety of new opportunities, especially in public safety and incident response scenarios. Mosaic ATM, alongside business partner Device Solutions, Inc., has received NASA Small Business Innovation Research (SBIR) funding to investigate the feasibility of using ATSC 3.0 to help support wildland fire management operations.

In this presentation, we will discuss a proposed innovation called the NextGen Incident Response Communication System (NIRCS). NIRCS is a rapidly deployable, mobile, long-range broadcast communications system. NIRCS will make use of ATSC 3.0 technology - the digital terrestrial broadcast system built on the internet protocol (IP) - to enable one-way datacasting of IP-compatible data, including ultra-high-definition video, high-fidelity audio, and other types of data packets (e.g., aircraft position messages). One can think of NIRCS as an ATSC 3.0 broadcast station "on the go," ready to move to and support emergencies on demand.

The intent behind NIRCS is to address one of the NASA ACERO project's critical technological needs: a reliable, resilient, and secure data communication system for quick data dissemination to support effective decision-making. NASA's Advanced Capabilities for Emergency Response Operations (ACERO) project focuses on the use of uncrewed aircraft systems (UAS) and other advanced aviation technologies to improve wildland fire coordination and operations. In today's wildland firefighting operation, UAS, which have many practical and life-saving applications, are considerably separated (in time or space) from the firefight because crewed aircraft (e.g., slurry bombers) are unaware of UAS positions during operations. This uncertainty in UAS position results in an unacceptable collision risk between crewed and uncrewed aircraft, thus the need for expansive separation. With the proposed innovation, NIRCS, collocated with UAS wildland firefighting operations, would datacast the real-time position of UAS to crewed aircraft (ground to air), allowing for the safe and more efficient integration of UAS in the operational airspace. Furthermore, owing to the flexibility of the ATSC 3.0 technology, NIRCS would also datacast UAS operational volumes and UAS surveillance video.

Questions?

www.fredengelconsulting.com
fred@fredengelconsulting.com