

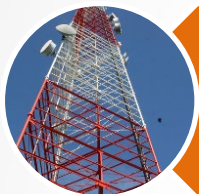


# New BPS™ Activities, Industry Collaborations, and Deployments

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NAB



# What is Broadcast Positioning System (BPS)?



A system and method of estimating time and position at a receiver using Next Gen TV broadcast signals



Compliant with Next Gen TV (ATSC 3.0) standard currently being deployed in the US

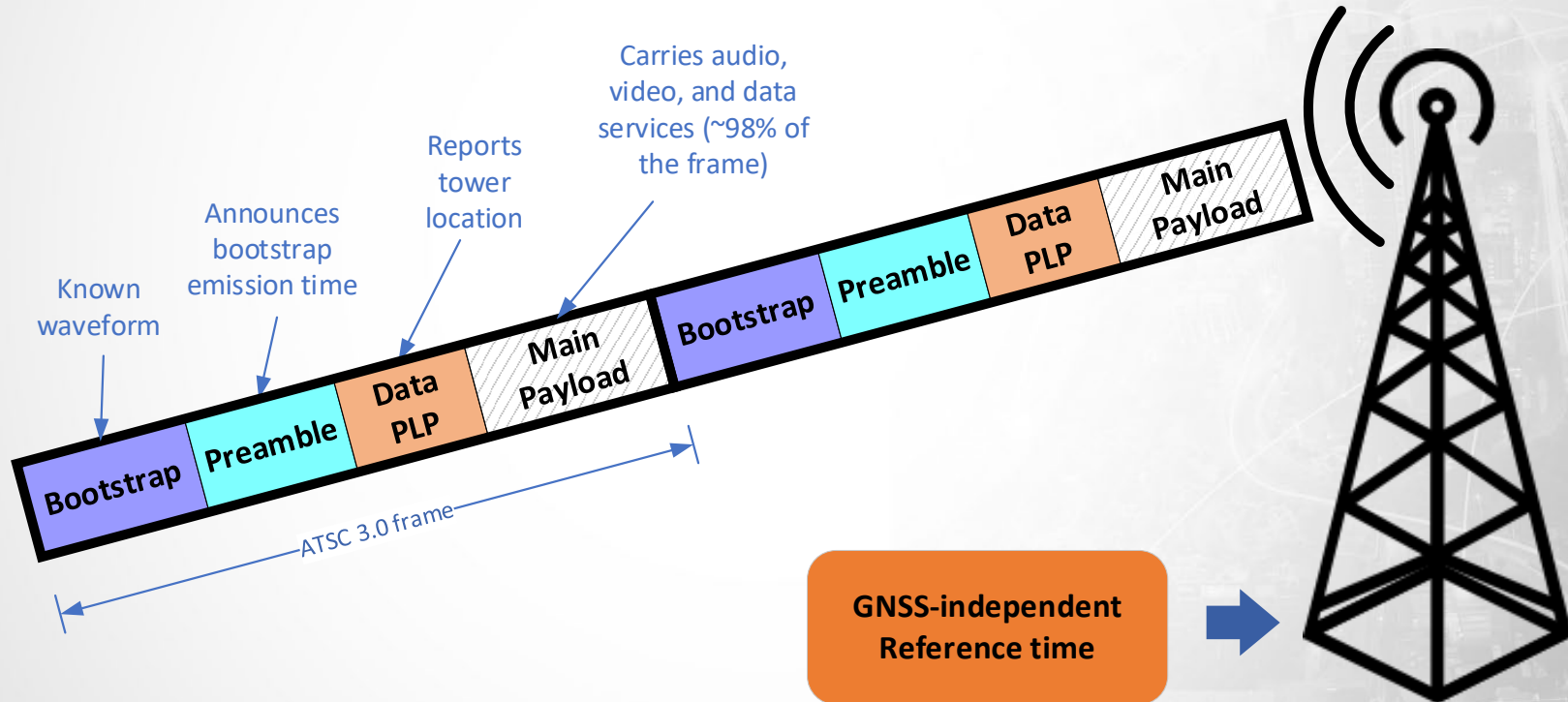


Independent and stand-alone

- GPS, Internet or cellular connectivity not required



# Concept





# New Developments Since WSTS 2025

Operational  
network in DC-  
Baltimore area

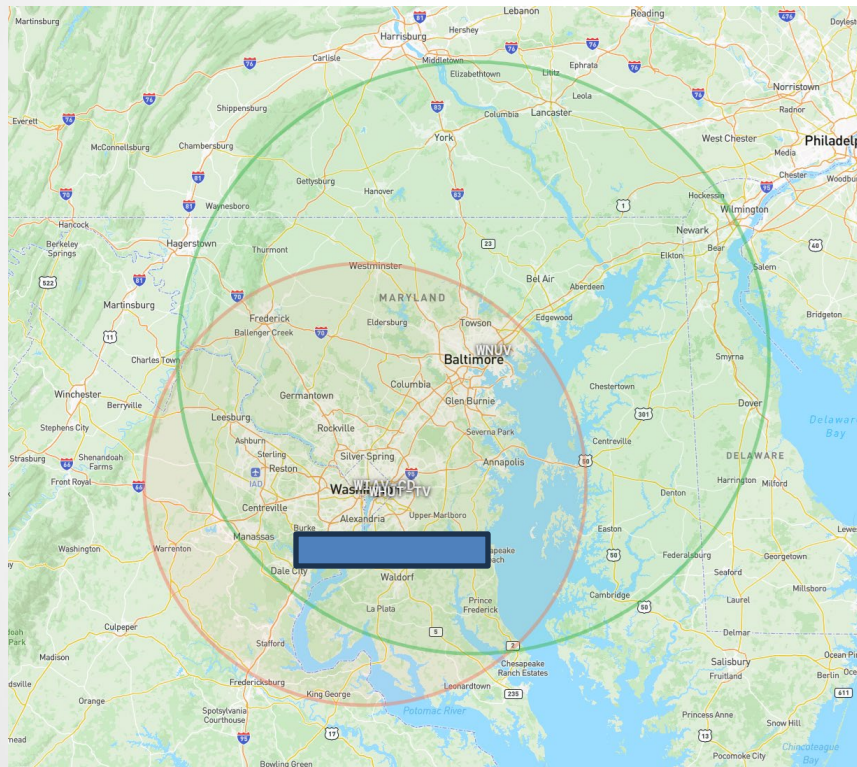
Test at a power  
substation  
(DOT)

Network  
monitoring

New Receivers

BPS  
Aggregator  
Software

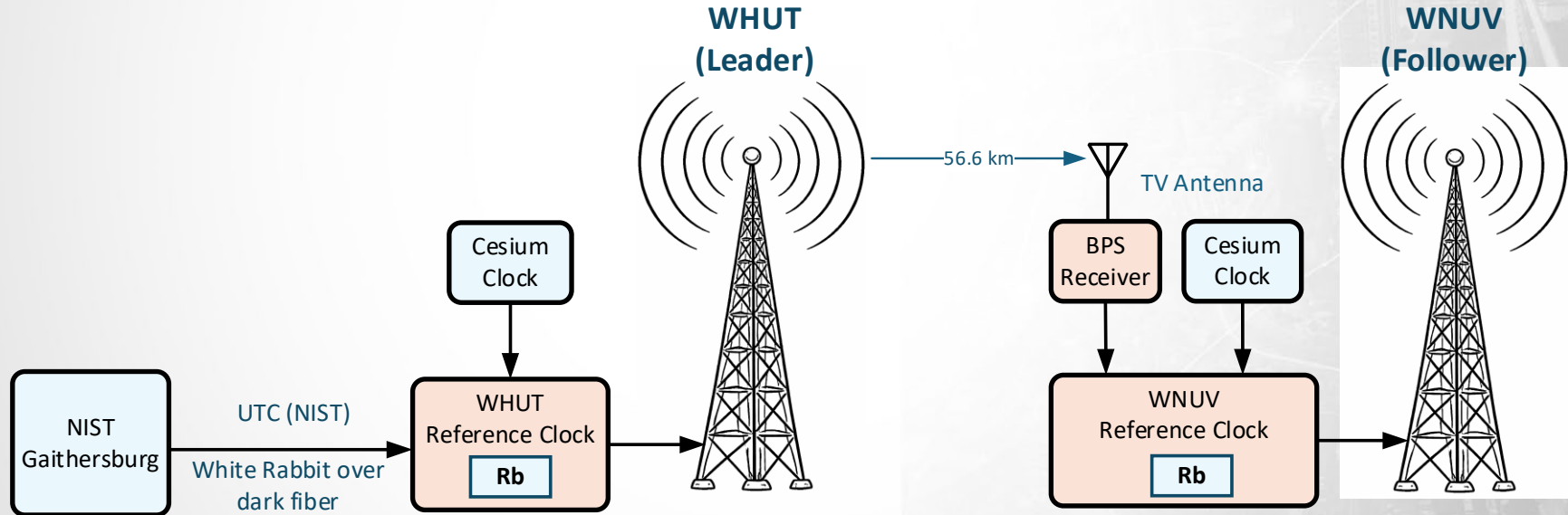
# Current BPS Network



- **WHUT and WNUV**
- Leader-follower configuration
- -5 dB SNR contour



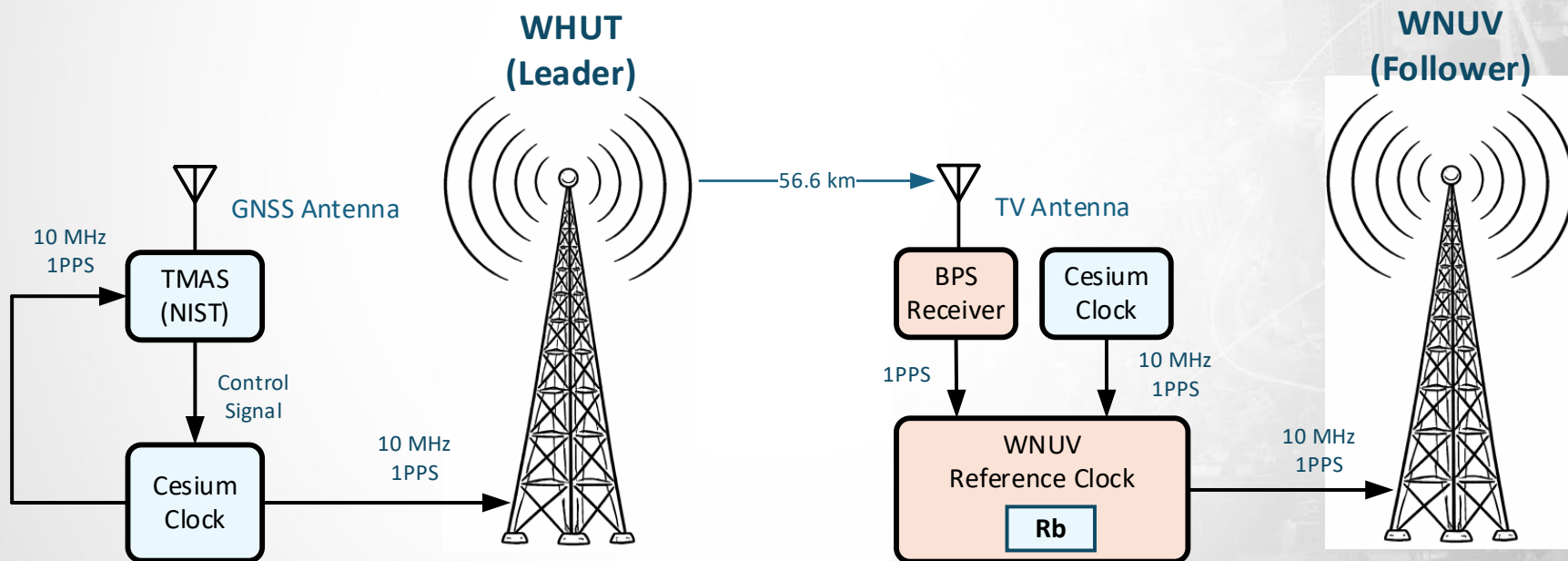
## Long Term Goal: Traceable time from NIST over Dark Fiber





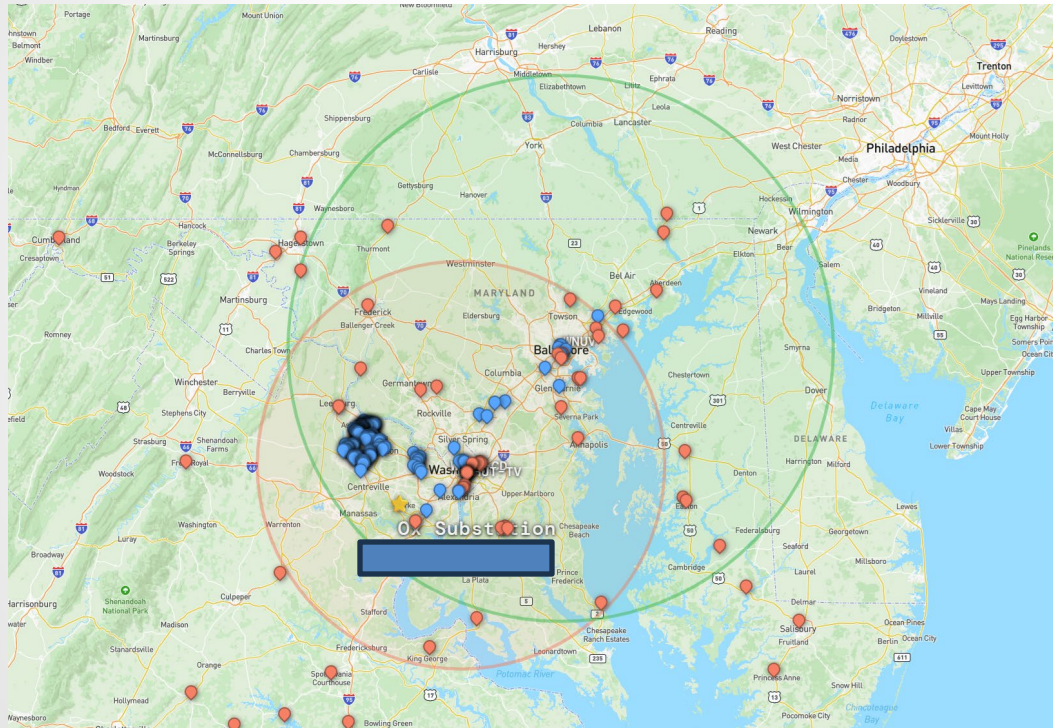
# Current Configuration - TMAS by NIST

*GNSS is not directly used in the network*



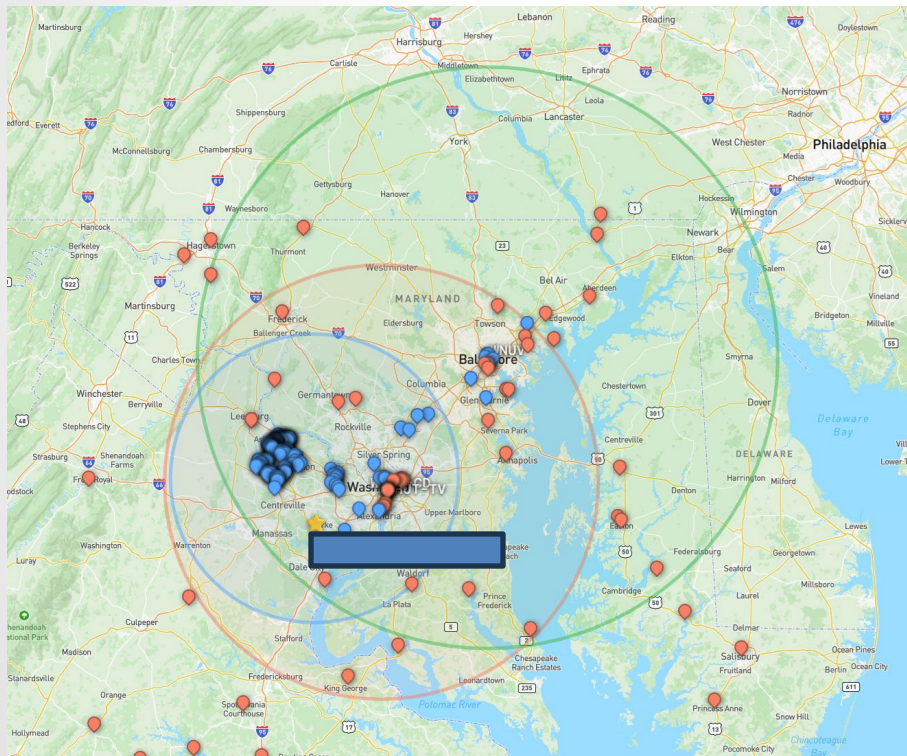


# Examples of CI Within Coverage Area



- **Orange** – power substations
- **Blue** – data centers

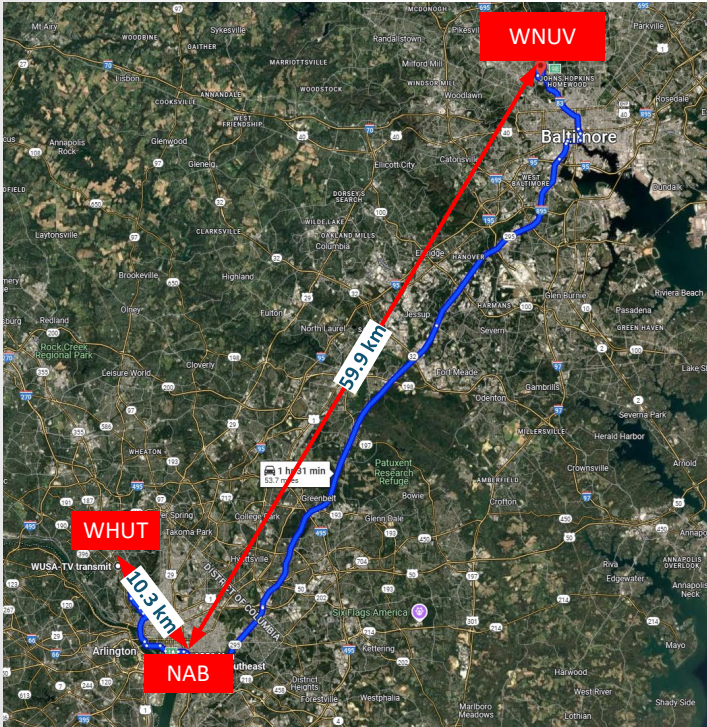
# Network Expansion



- **WIAV** in Washington DC
- Frequency diversity
- Time combining with 3 sources
- Positioning and hop-count testing

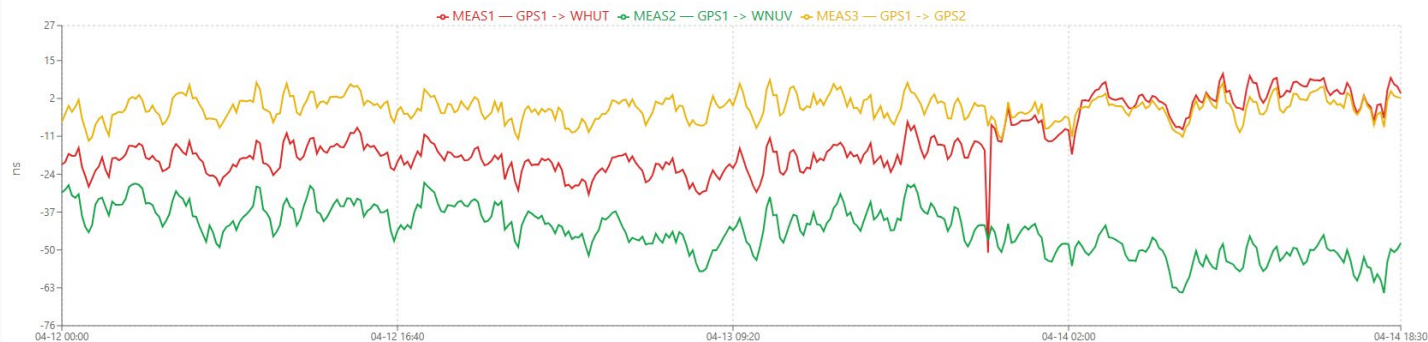


# Network Monitoring from NAB Lab





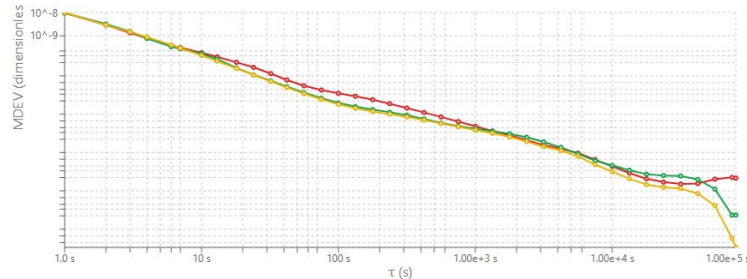
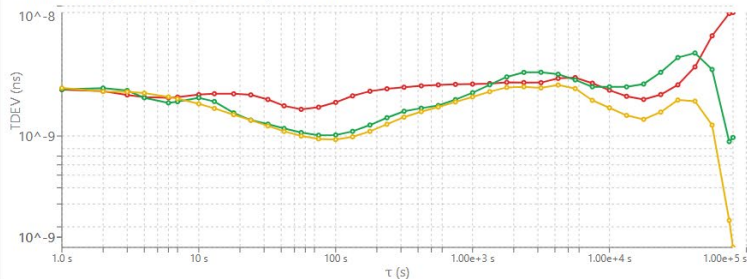
# Monitoring Dashboard



## Stability metrics

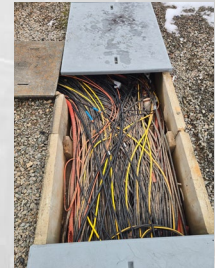
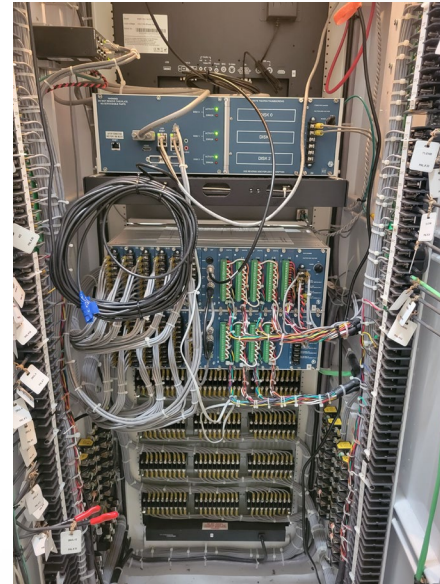
$\tau_0 = 1 \text{ s}$  • sources: 3

MDEV/TDEV are computed automatically for the currently selected sources.



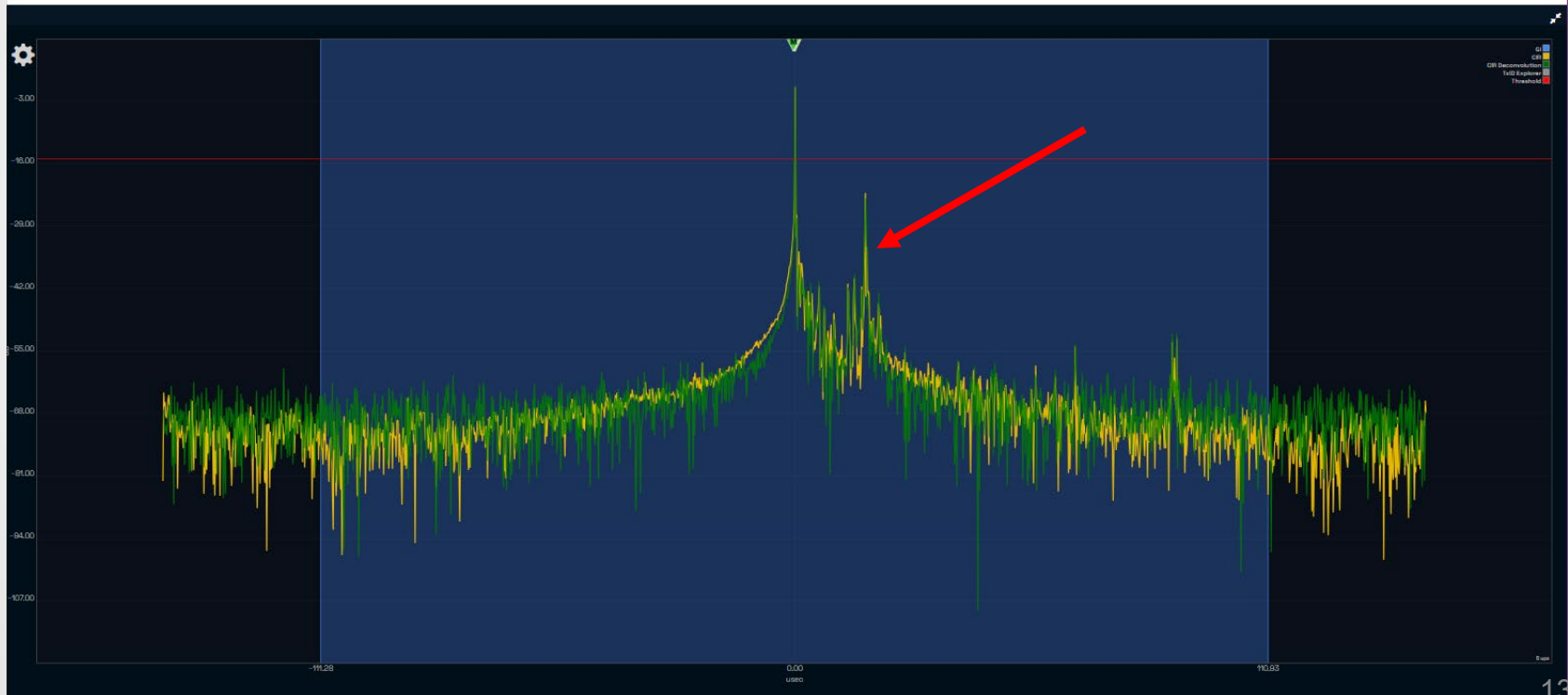


# Testing at a Power Substation



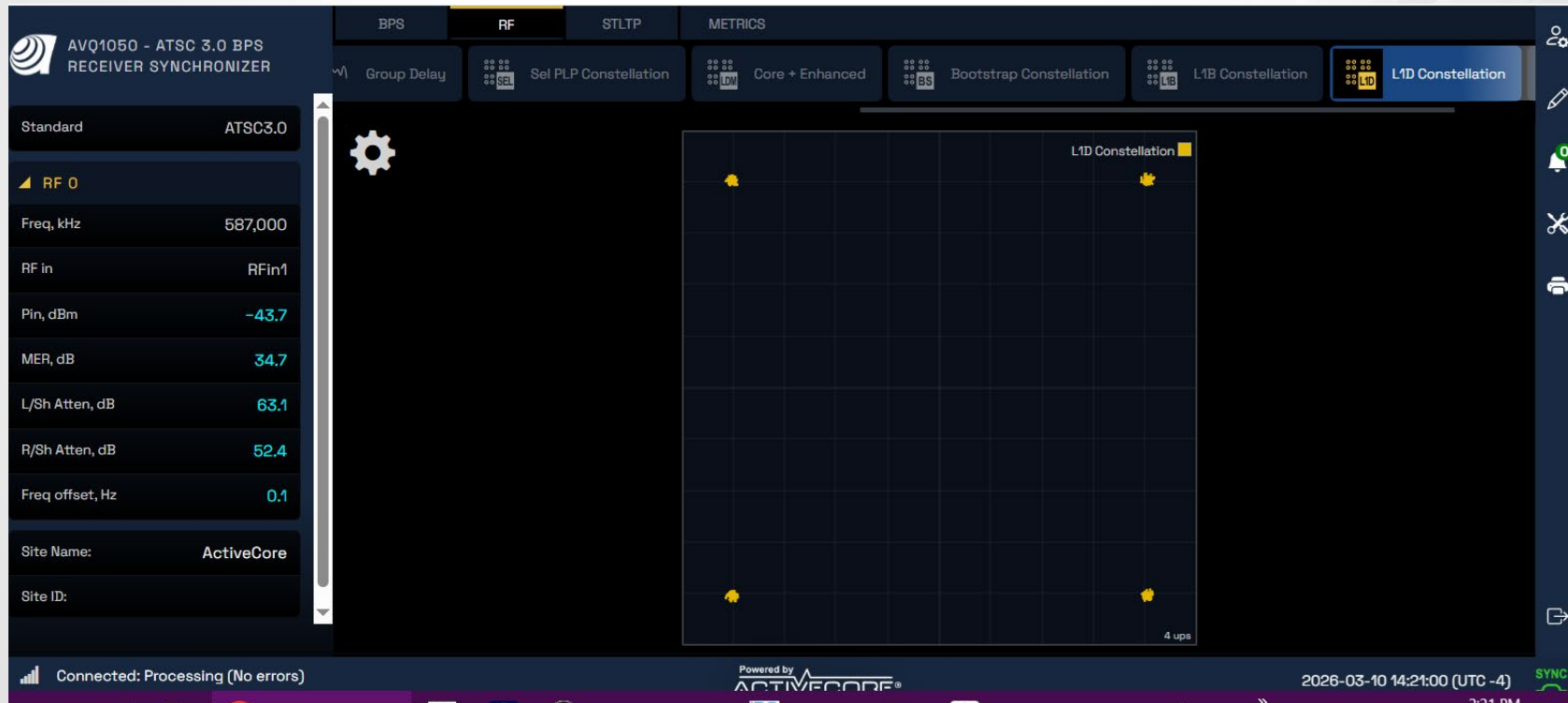


# WHUT Channel Response at Substation





# WHUT Signal Constellation carrying BPS





# Receivers

## Currently available receivers:

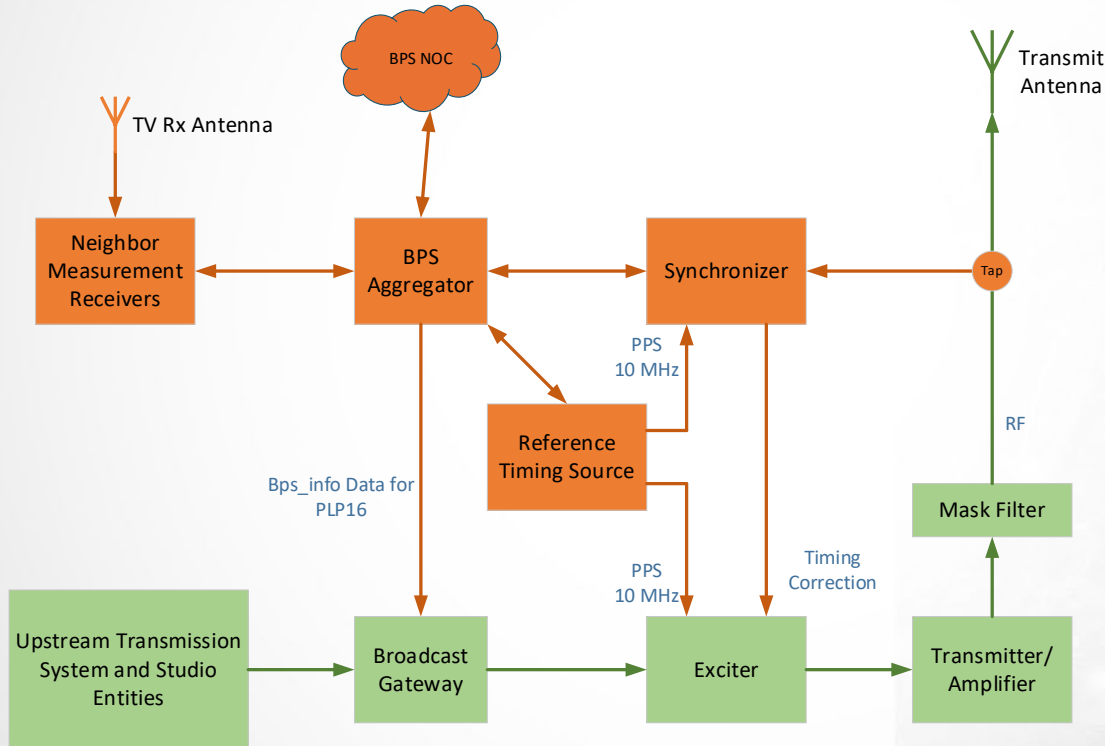
- 3U unit with IRIG, PPS, 10MHz, and NMEA outputs
- 1U unit with PPS, 10MHz, and NMEA outputs
- Small, portable receiver with PPS and 10 MHz output
- 1U four-channel receiver with PPS, 10MHz, NMEA, time combining, and positioning capabilities.

## Receivers in-progress:

- Licensable VHDL code
- M2 form factor



# BPS Aggregator at a TV Station



- **Green** – existing TV transmission chain
- **Orange** – BPS modules overlayed at a TV station



## BPS Aggregator

Developed software that inserts BPS in TV transmission chain

Compatible with equipment/software from major ATSC 3.0 suppliers

Building block of network management system



# Summary

A BPS network is now available for time delivery testing

BPS is ready for nationwide deployment

A public-private partnership can make it happen quickly



# Thank You

**[nab.org/bps](http://nab.org/bps)**

**[tmondal@nab.org](mailto:tmondal@nab.org)**



# Backup Slides



# WHUT (Washington, DC)



|                                                              |               |
|--------------------------------------------------------------|---------------|
| Transmit Channel                                             | 33            |
| Frequency                                                    | 584 - 590 MHz |
| Effective Radiated Power (ERP)                               | 416 kW        |
| Antenna radiation center Height Above Average Terrain (HAAT) | 254 meters    |





# WNUV (Baltimore, Maryland)

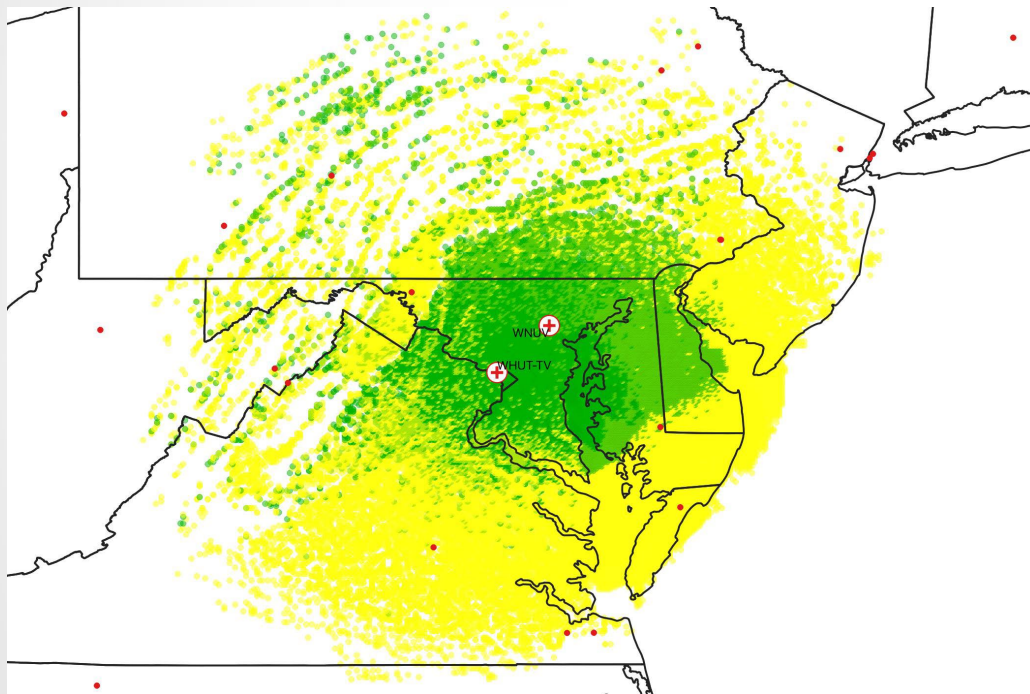


|                                                              |               |
|--------------------------------------------------------------|---------------|
| Transmit Channel                                             | 25            |
| Frequency                                                    | 536 - 542 MHz |
| Effective Radiated Power (ERP)                               | 750 kW        |
| Antenna radiation center Height Above Average Terrain (HAAT) | 456.8 meters  |





# WHUT and WNUV Combined Coverage Map



- Signal reaches to parts of Maryland, Virginia, Washington DC, Delaware, New Jersey, Pennsylvania, and West Virginia
- **81,245** square-km of BPS coverage



# KWGN (Denver, Colorado)



|                                                              |               |
|--------------------------------------------------------------|---------------|
| Transmit Channel                                             | 34            |
| Frequency                                                    | 590 - 596 MHz |
| Effective Radiated Power (ERP)                               | 1000 kW       |
| Antenna radiation center Height Above Average Terrain (HAAT) | 336 meters    |

