VIAVI Solutions

High Split Leakage and OUPD

SCTE

Tim Miller
Systems and Solutions
April 2, 2026

Overview

1. Background on Leakage detection
   Ingress and Egress what is it?
2. Why do we care?
3. How high-split changes things
4. OUDP to the rescue
5. How this impacts what we do in the field
6. Review Quiz
7. Q & A

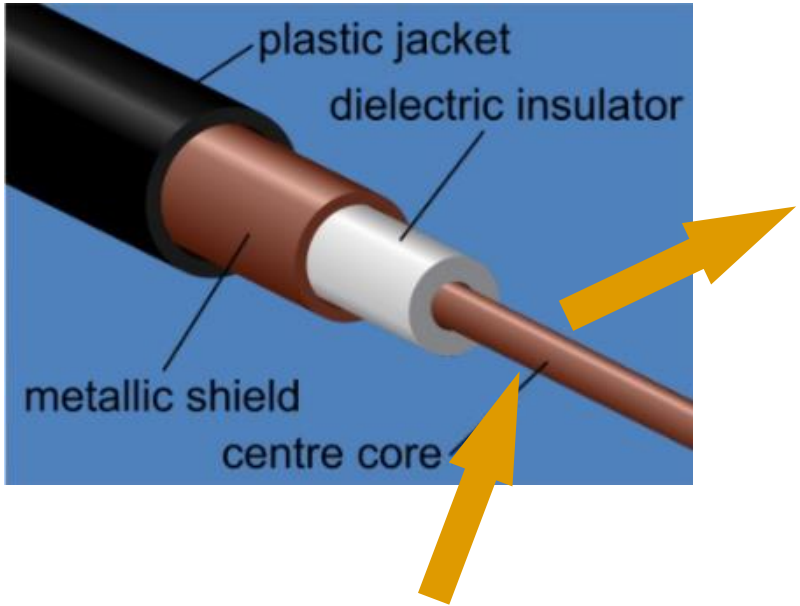
Why Is It Important To Control Signal Leakage?

- Government regulations to protect over-the-air radio transmissions (mainly airline traffic)
- COMPETITION
- Two-way cable networks require stringent leakage control to maintain the expected quality of service (reduce service calls)
- Cable Systems are becoming very high-tech and interactive analog (video-audio) & digital networks.
- Digital Services - Video - Audio, “Video on Demand”, High Speed Modems, Meter Reading of Utilities, Security Systems and Telephony.

Why Is It Important To Control Signal Leakage?

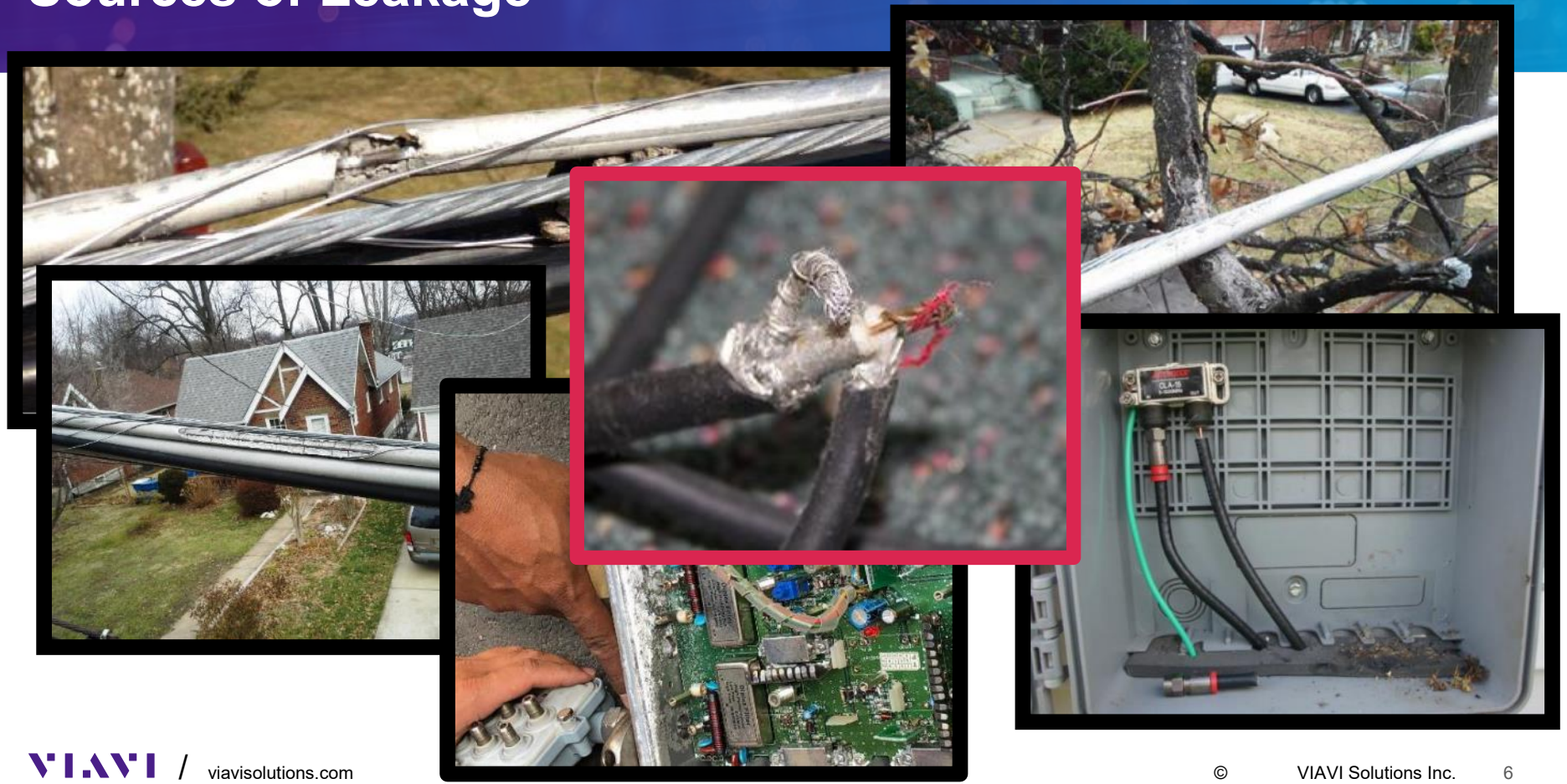
- Most common source of leaks is within the home wiring (approximately 75%) and drop cable (approximately 20%). There's a lot of homes that still have the original wiring from 20-30 years ago.
- Inferior quality coaxial cable, passives, connectors
- Poor installation of splices and connectors - water and weather can result in pulled out, loose or corroded connectors.
- Illegal connections to neighbor's cable

Why we use Coaxial Cable



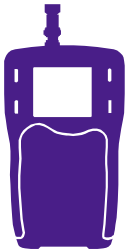
Damage to this sealed system can cause signal leakage (ingress and egress)

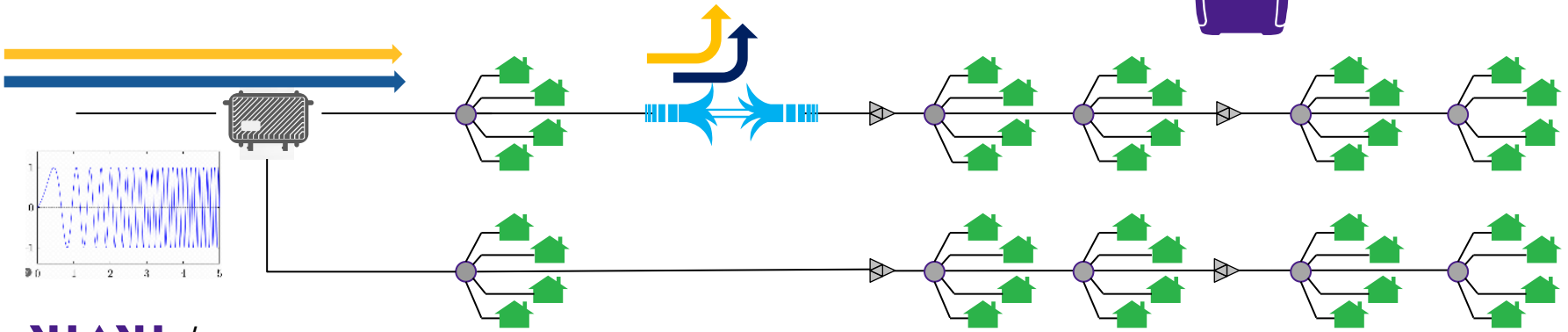
Sources of Leakage



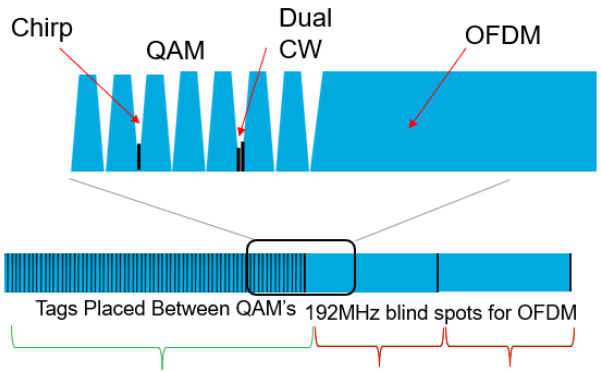
What it takes to effectively detect Ingress and Egress

1) Carriers at the frequencies to be monitored (Aeronautical and LTE)
2) Tagging the carriers so you know they're your carriers
3) Receiver to pickup the energy
4) Antenna to help with gain and direction
5) GPS to know where the leak was detected
6) System software to collect leaks, correlate and produce reports





Where to Inject Leakage Tag?



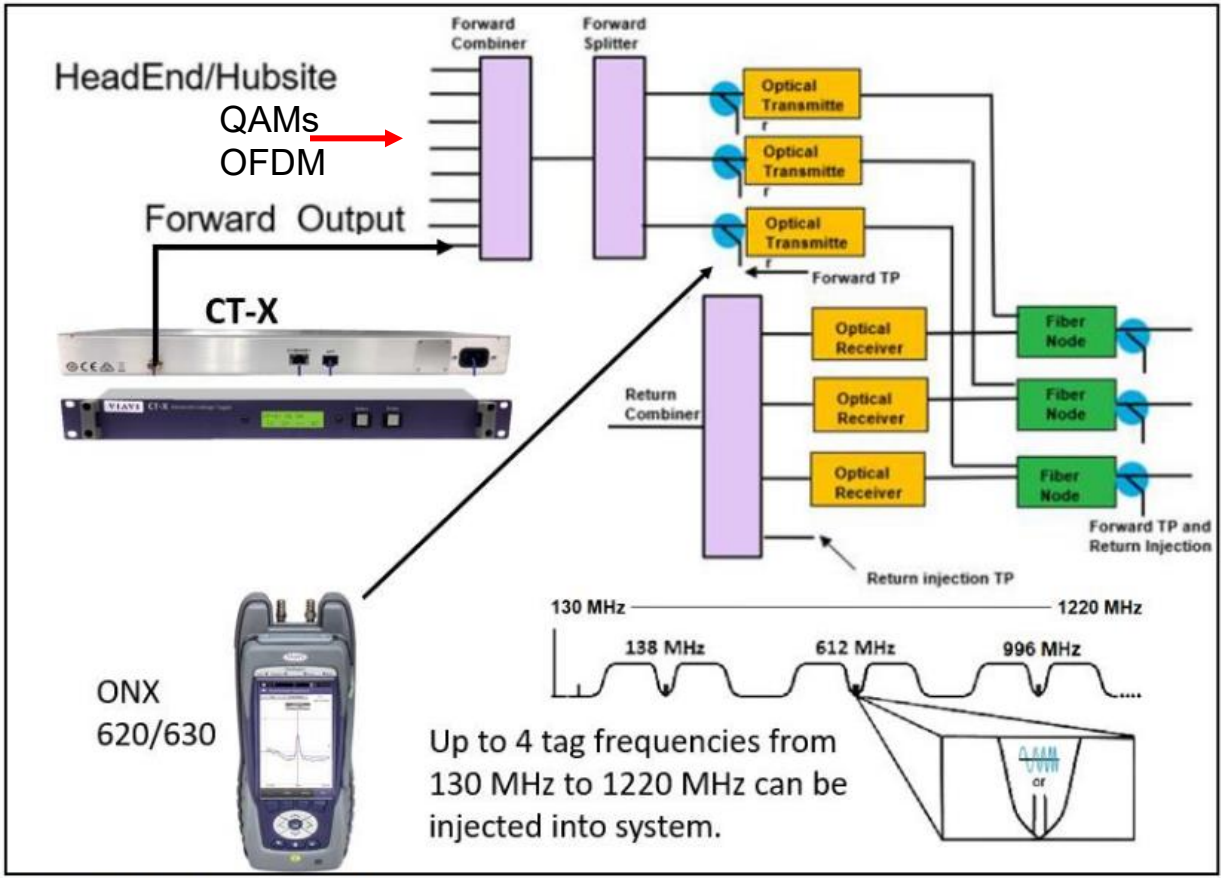
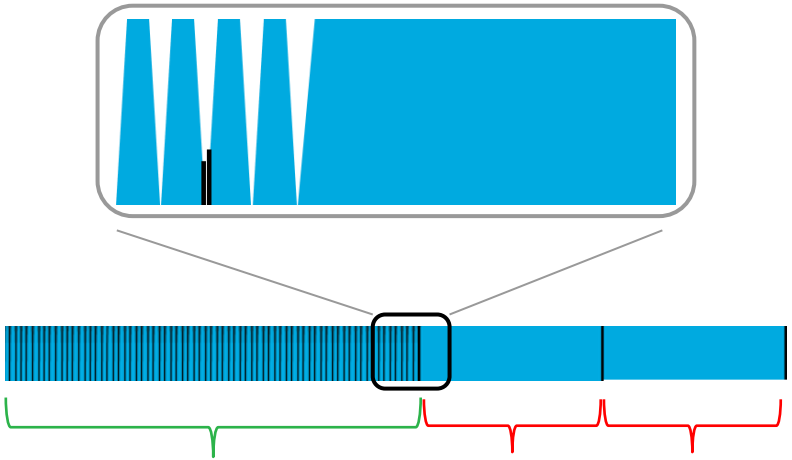


Figure 5: CT-X placement in Headend

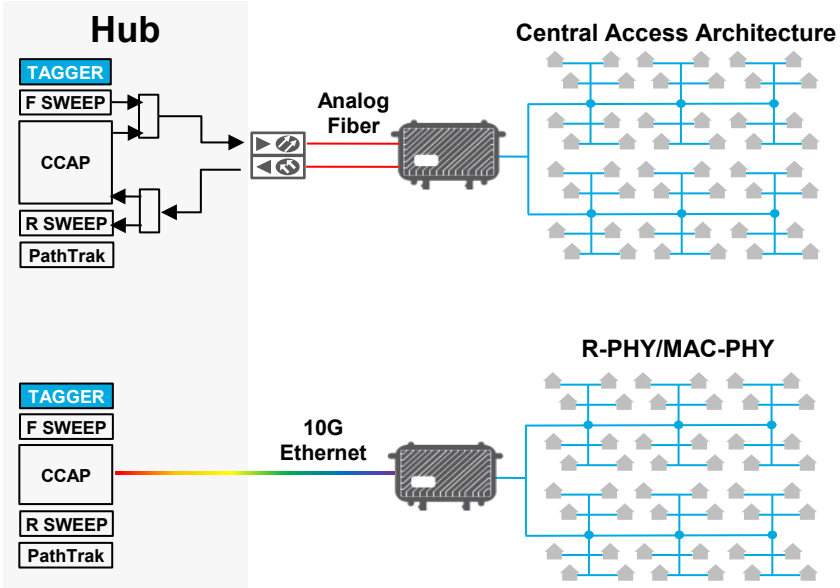
VIAVI Seeker X Platform is Ready for the Evolving HFC

192MHz Wide OFDM Carriers



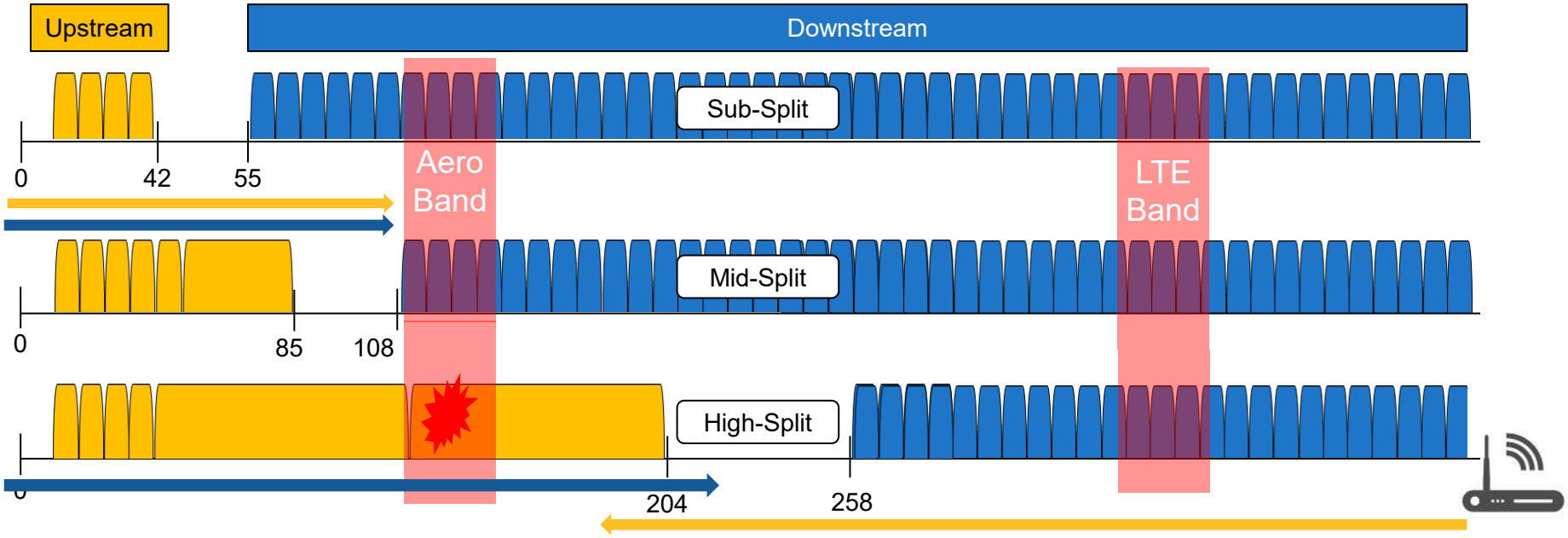
Solution:
OFDM Carrier used as virtual tag (anywhere across carrier)

R-PHY Disallows RF Tagger In Hub



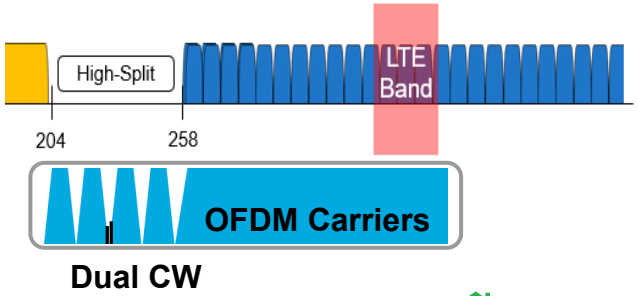
Solution:
Leverage remote PHY Unit as virtual tagger (all major NEMS)

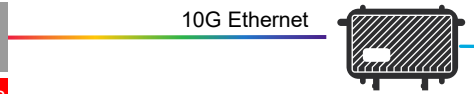
So, why does High-Split Change things?

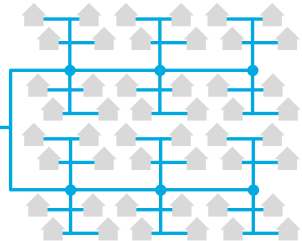


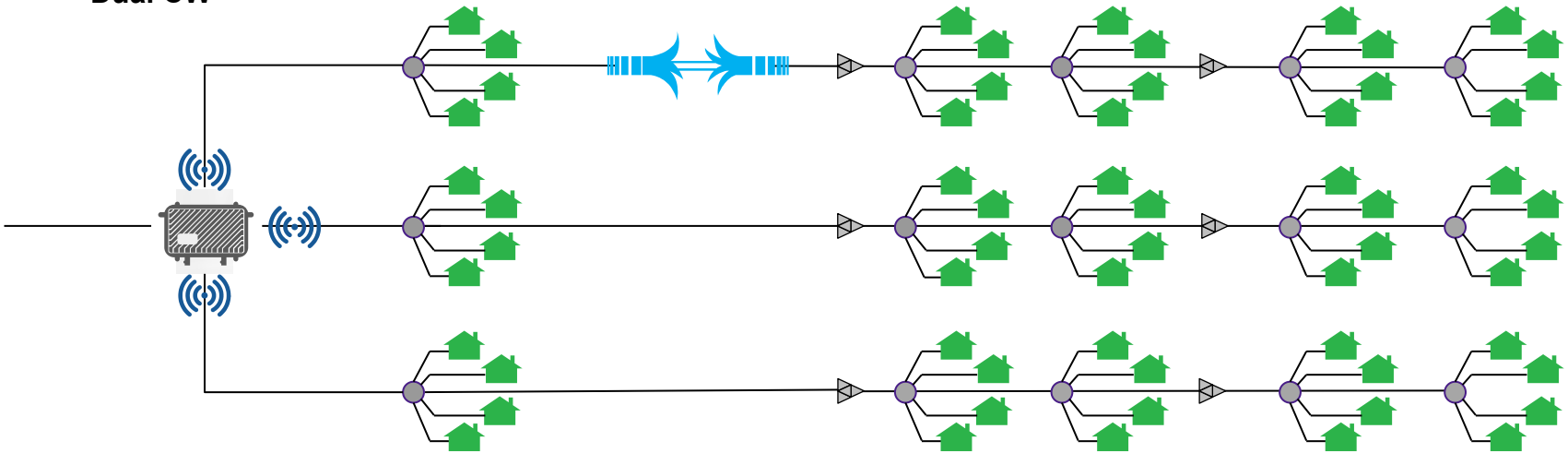
When the split is moved to above the aeronautical band, there's no way to originate a carrier in that band from the hub site, thus any signal use to detect Leakage would need to originate from the customer modems

For the upper carrier – it still originates from the hub or DAA

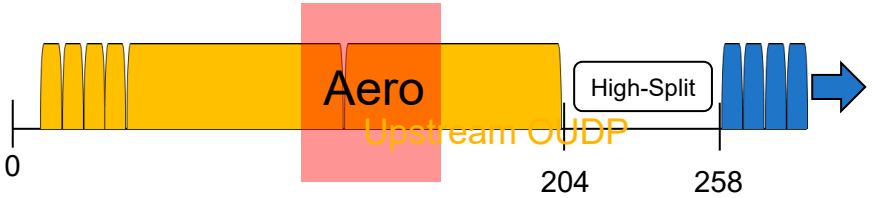


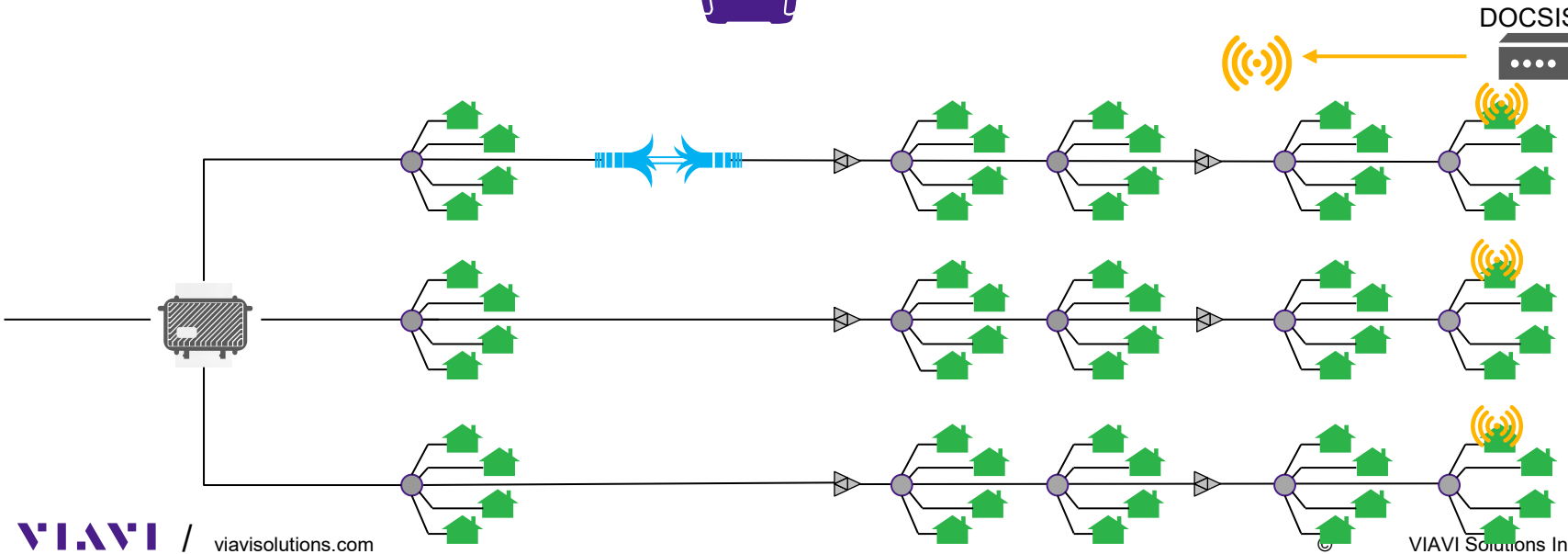


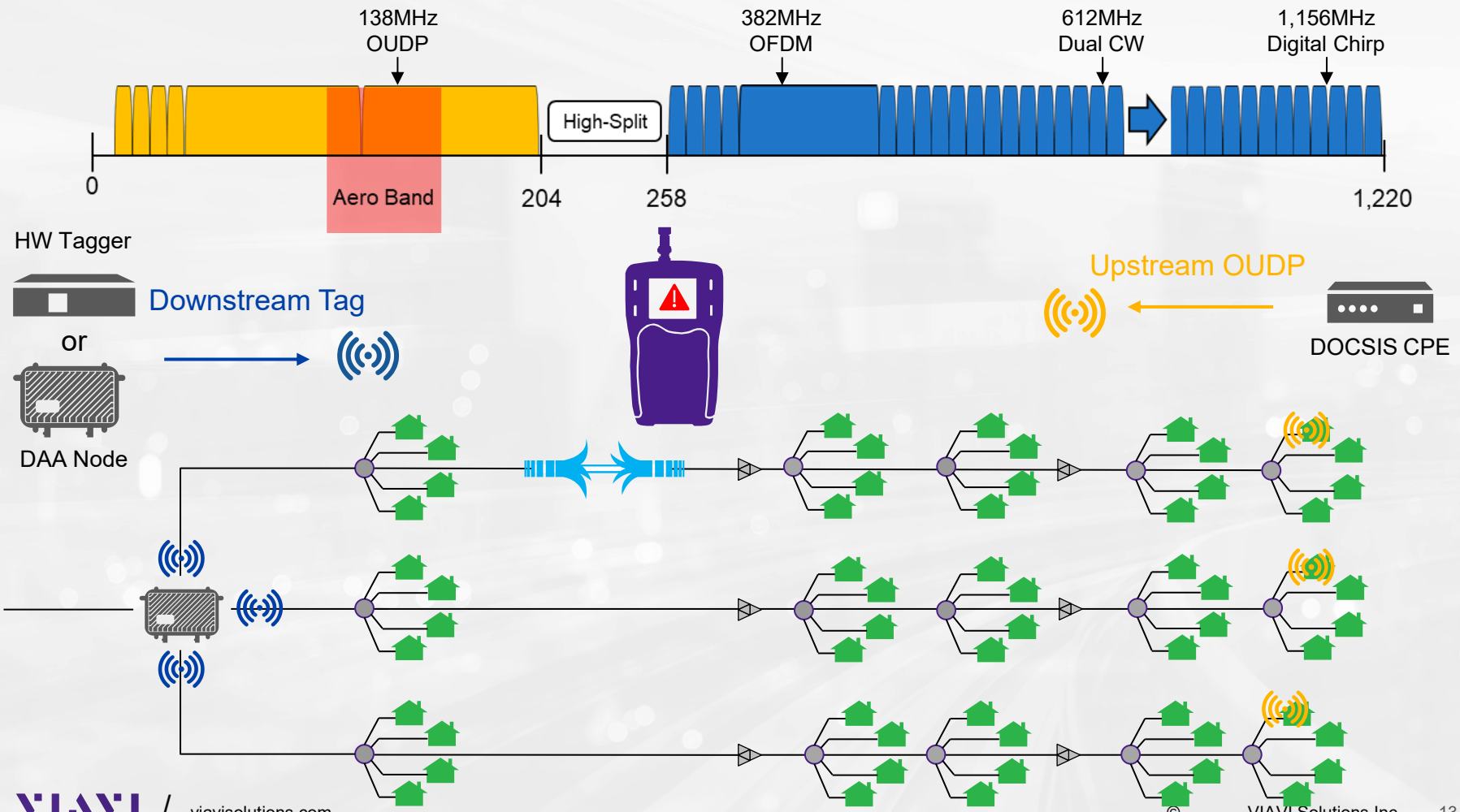




For the aeronautical - it needs to originate from the plant







How do we create a reliable signal from the modems?

Need a carrier that is reliable, at the correct frequency and doesn't take up significant bandwidth in the OFDMA upstream data carriers.

OUDP to the Rescue!

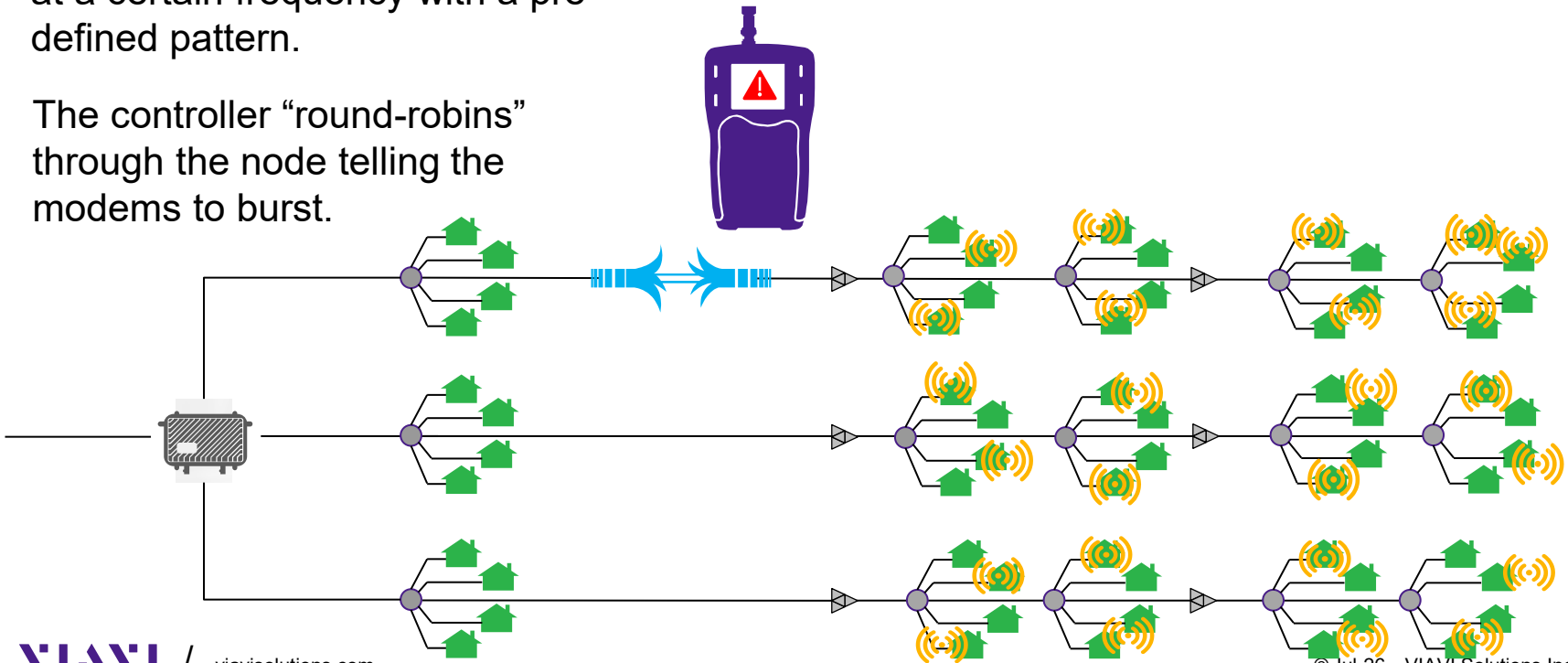
OFDMA **U**pstream **D**ata **P**rofile

OUDP Test Bursts are generally used to determine the maximum modulation the modem can support.

- Included in the DOCSIS 3.1 and 4.0 Standard (requires D3.1 modems)
- Enabled by the central controller (CMTS/CCAP)
- Configurable patterns can be set

Using OUDP Bursts for Leakage Detection

- The Modems send an OUDP burst at a certain frequency with a pre-defined pattern.
- The controller “round-robins” through the node telling the modems to burst.

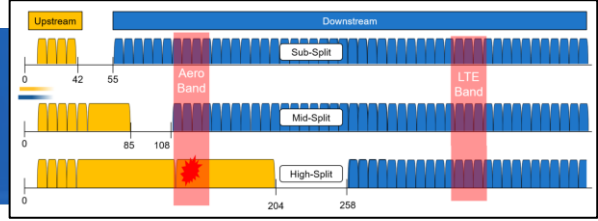


What changes are required to the leakage system to detect OUDP bursts

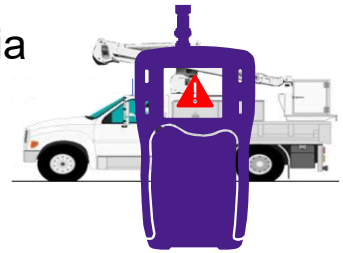
The beauty of this solution is that not a lot has to change:

- Rather than a conventional tag, receiver must recognize the OUDP Burst Pattern Configured
- As the frequencies are the same, no need to change antennas
- However, there are “gaps” in the signal as them modem bursts round-robins through the node.
  - Therefore, when moving the antenna - Move Slowly!
- Let’s listen to the difference

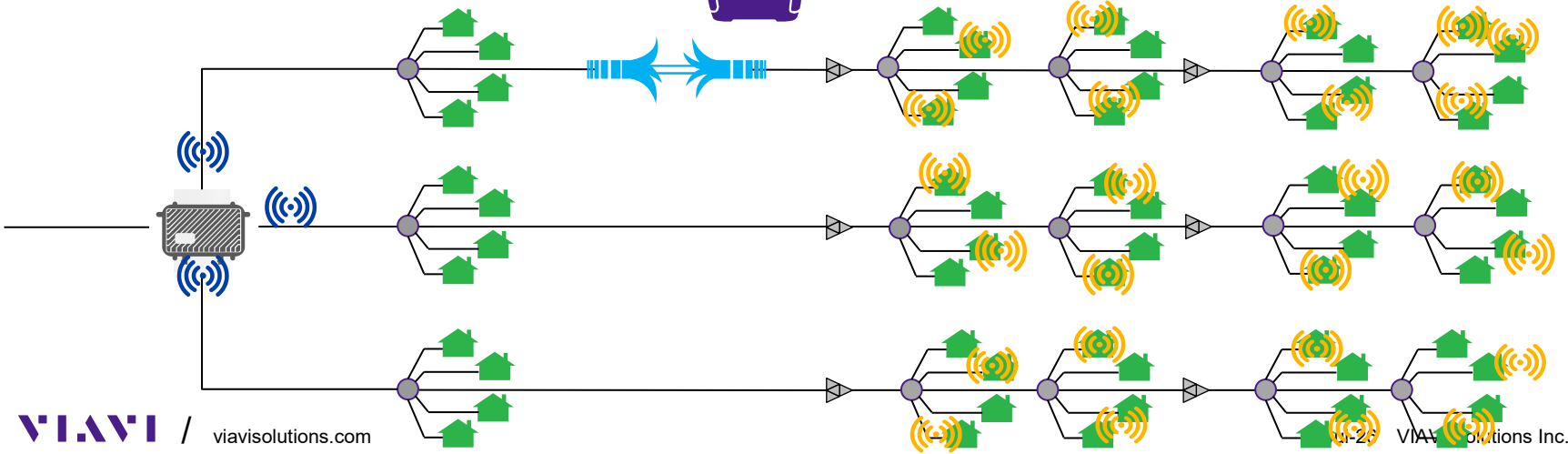
Summary and Review



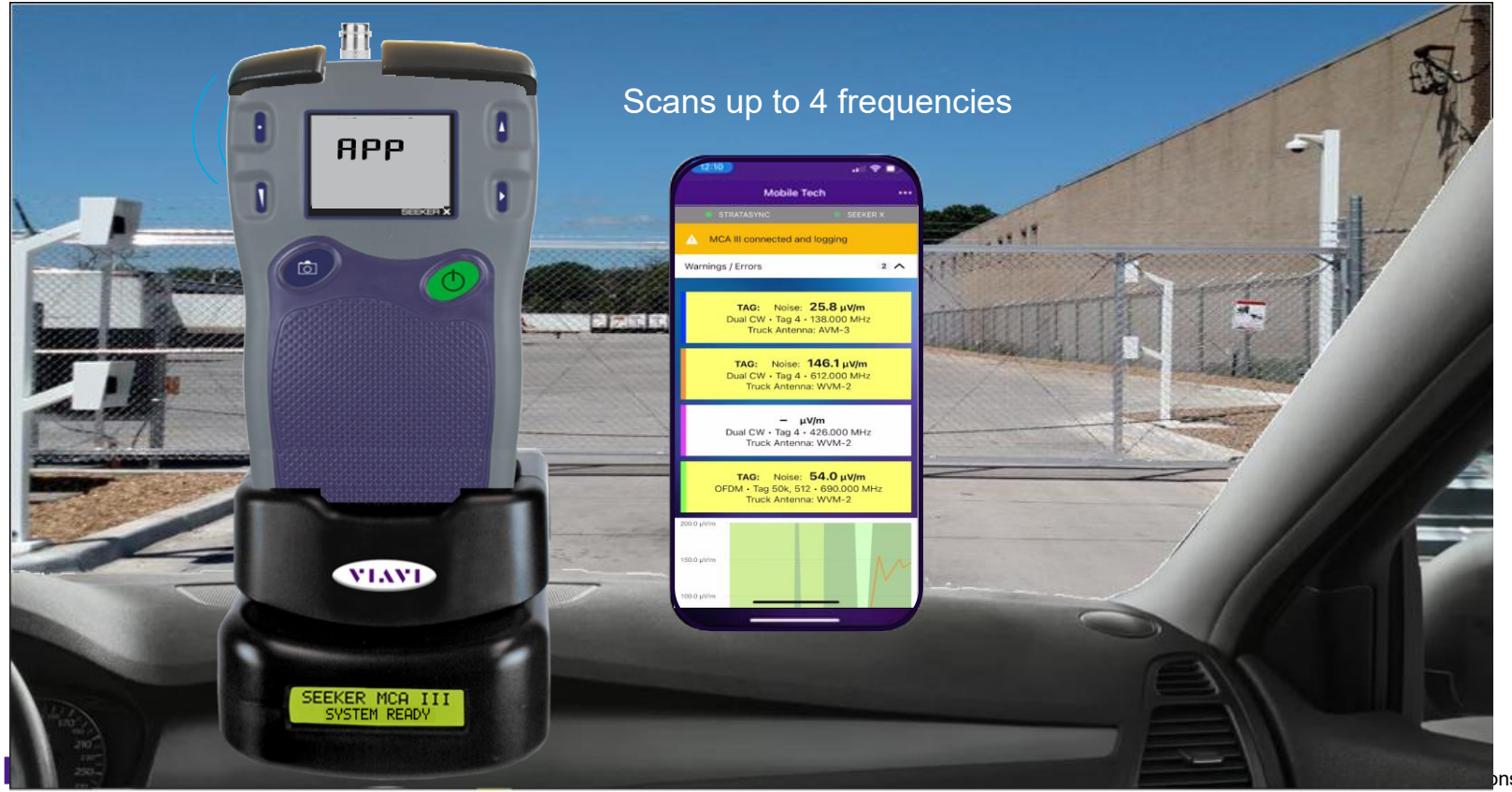
- High-split requires changes to how leakage is monitored in the Aeronautical band
- Cable Modems are used to transmit the leakage carrier via OUDP burst technology.



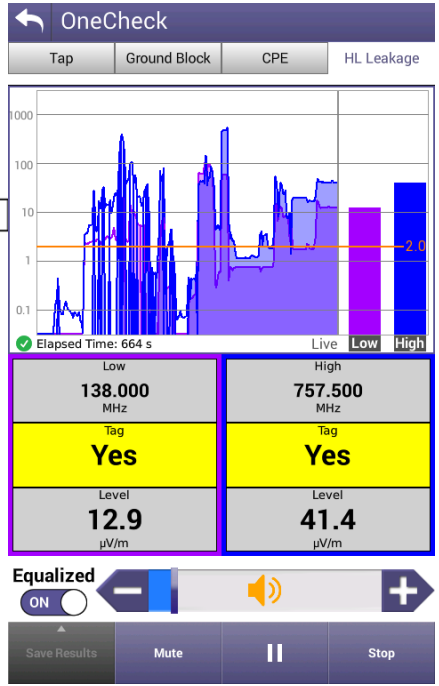
- Enhancements to the leakage detector might be required, but most other techniques to isolate and fix leaks remain the same.



Successful Leakage Program
Verify your Trucks are picking up leaks daily.



HL Leakage – Advanced Coax Shielding Integrity Testing



- Connect the HL Transmitter to the subscriber's premises coax and turn on the transmitter
- Now walk the subscriber's premises looking and listening for leaks coming out of the coax
- As the ONX measures leakage levels those values will be continuously updated
- Also a historical graph will be shown representing both Low and High measured frequencies over time
- When complete press the "Stop" button
- Press the back button to return to the OneCheck Selection screen

OUDP Leakage Overview – Pressure Test Using Modem

204MHz High Split networks moved the FCC aeronautical band into the upstream spectrum – requiring the industry to adjust – resulting in upstream OFDMA's built-in OUDP signaling as the solution

- Every modem transmits an OUDP signal at 138 MHz when instructed to by the CMTS – this is automatic after modem is fully connected

Attach the current HL Leakage Antenna to the ONX – current antenna is already properly tuned for the OUDP frequency at 138 MHz

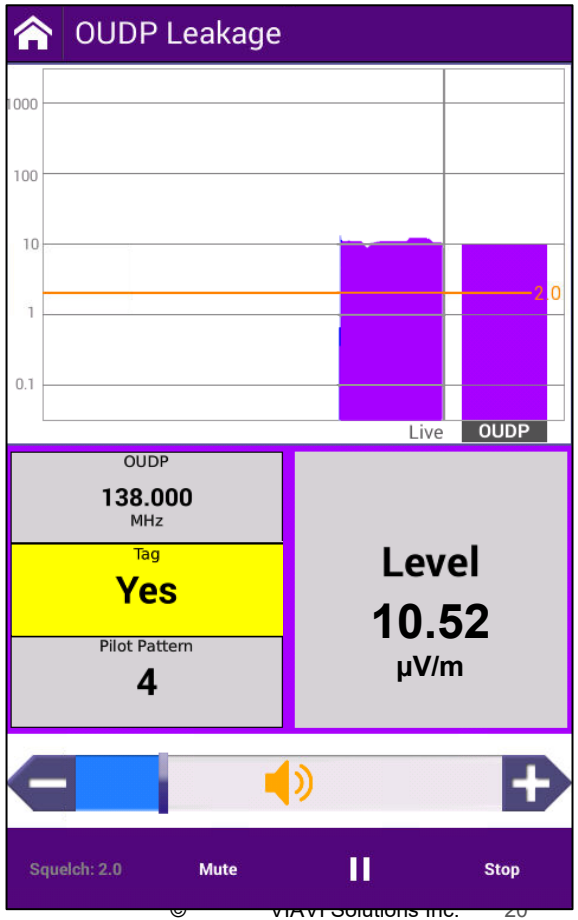
Walk the home and drop cable looking for shielding integrity issues detected by the ONX – Loose connections, exposed cable, bad shielding

User Interface looks like current HL Leakage interface – single frequency

- Easier transition to new mode

ONX measures the Off-Air signals looking for the OUDP upstream signal leaking out of the home coax or drop cable

When detected the ONX will identify the presence (Tag) and show the signal strength measured at that location



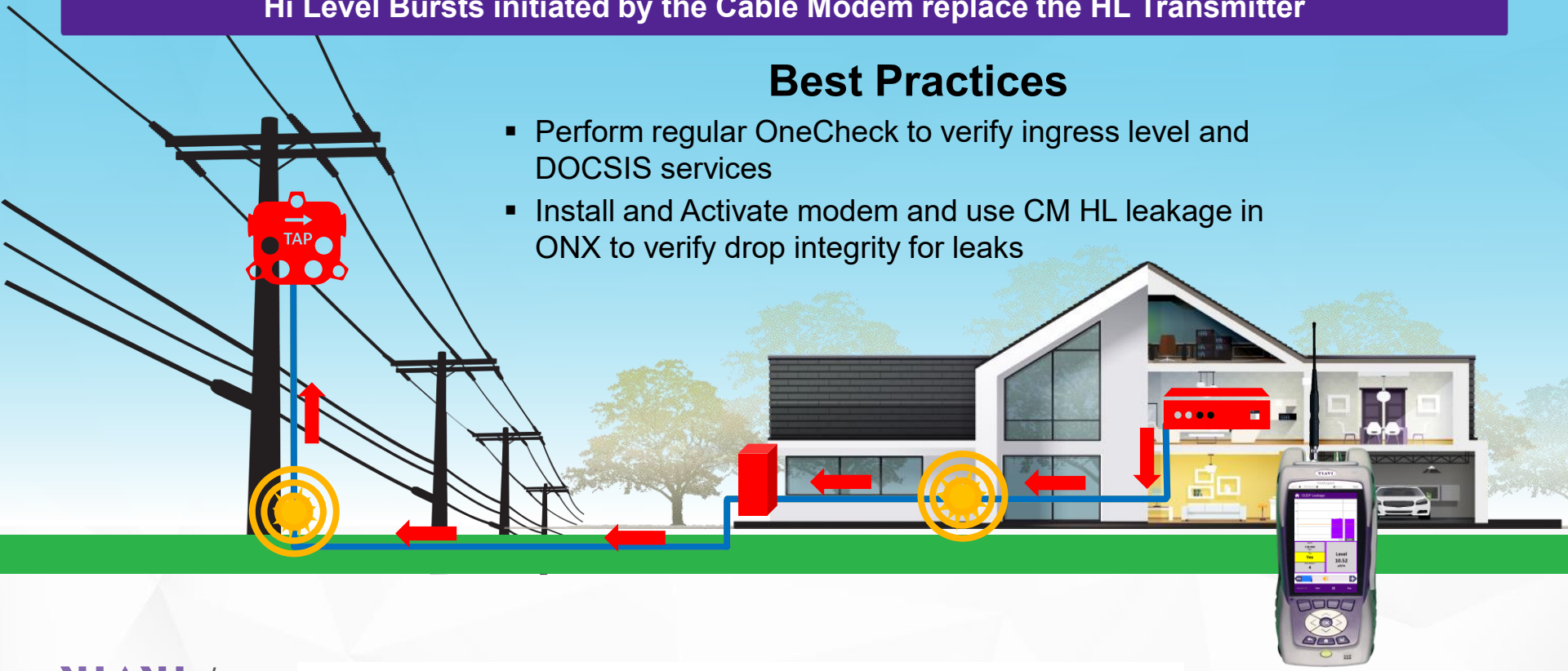
Home Leakage Pressure testing using OUDP

In Candidacy

Hi Level Bursts initiated by the Cable Modem replace the HL Transmitter

Best Practices

- Perform regular OneCheck to verify ingress level and DOCSIS services
- Install and Activate modem and use CM HL leakage in ONX to verify drop integrity for leaks



Review Quiz

Question #1:

When switching to high-split there's no need to do leakage detection anymore:

A. True

B. False

False

Since we're still using those frequencies and we're the secondary user, by law we must continue to monitor signals leaking from our networks.

Question #2:

When switching to a high-split system, what moves from the downstream to the upstream:

A. HBO
B. Aeronautical Band
C. OUDP Test Bursts
D. LTE Band

Aeronautical Band

This band is 108 MHz to 137 MHz. When the upper end of the upstream is moved to 204 Mhz the Aeronautical Band (as well as other bands like the FM Radio Band) are now within the upstream spectrum rather than the downstream.

Question #3:

What is used to transmit the OUDP signals

A. My truck
B. The nodes
C. CCAP or CMTS
D. Cable Modems

Cable Modems

The DOCSIS 3.1 and 4.0 specification defines the OUDP burst that is used to test which modulation the modem is capability of using. It can also be used for leakage detection when configured properly.

Question #4:

Every cable modem can transmit an OUDP signal

A. True
B. False

False

Only DOCSIS 3.1 modems are capable of transmitting an OUDP Burst.

Question #5:

When detecting a leak in a high-split node it will sound like:

A. Steady tone
B. Queen's "We will rock you"
C. Studder tone
D. A slow warble

Studder Tone

The modems round-robin through the node generating generating OUDP bursts thus depending on where you're at in the node there might be gaps in the signal detected by the leakage receiver.

https://eguides.viavisolutions.com/catvleakage/


VIAVI
VIAVI Solutions
viavisolutions.com