



Creating Infinite
Possibilities.

Bringing the Mid-Split Factory Online to Rapidly Produce Terabits

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Possibilities.

Many Thanks to my Co -authors !

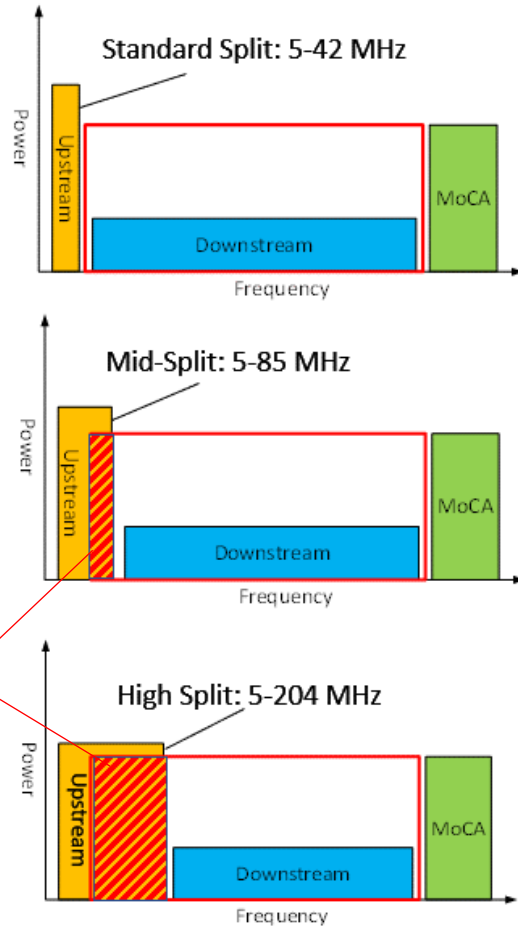
John Chrostowski

Robert Howald

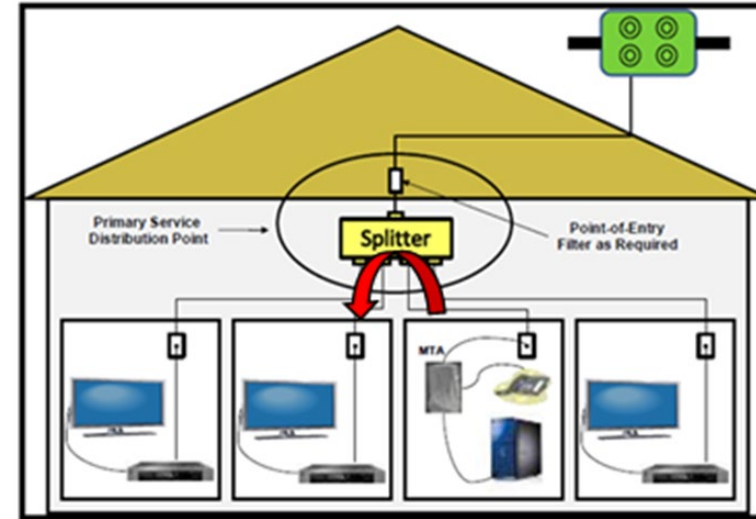
Chris Marinangeli

Robert Thompson

Mid-Split and Today's Home Are Not Made for Each Other



Carrier-to-Adjacent Channel Interference Ratio (CACIR)



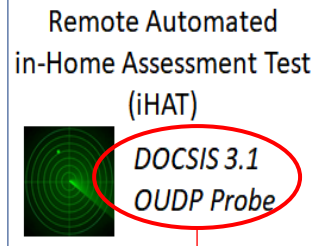
Built-in Challenges

- Low DS Rx and High US Tx (correlated)
- Leaky splitters, retail splitters
- Poor terminations
- Daisy-chained coaxial distribution

Core Functional Definition = Home MS Readiness

Discovery → Evaluation → Diagnosis

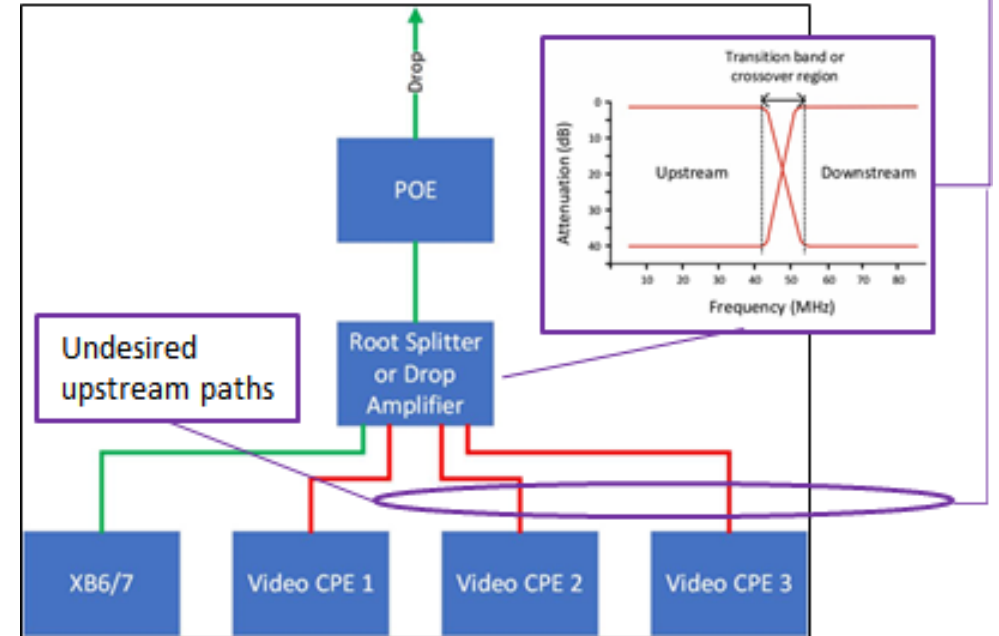
Eligible accounts identified
XG* STB MAC
XB6 or XB7 or higher MAC



- Full Diagnosis:**
- DOCSIS is Blocked? Yes / No
 - XG video is at Risk? Yes / No
 - OR No QAM Video Service
- Partial Diagnosis:**
- DOCSIS is Blocked? Yes / No
 - Cannot determine XG Video (no XG STB – legacy only STBs)



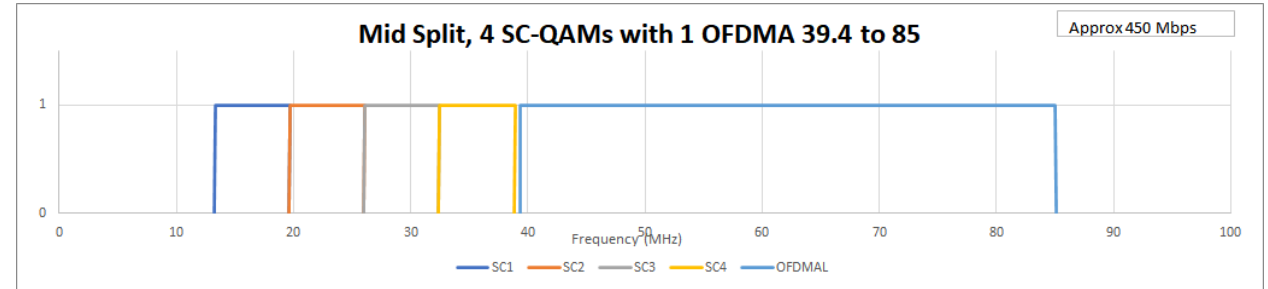
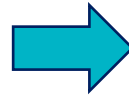
Two Essential Assessment are Automated with iHAT (below)



Mid-Split Activation Sample Results

Standard Mid-Split Spectrum Configuration:

4x DOCSIS 3.0 SC-QAM + OFDMA

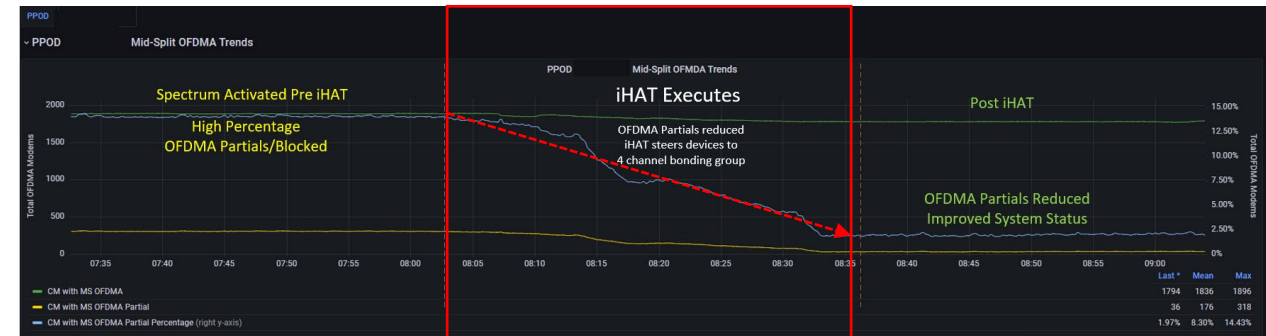
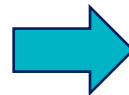


Across ~150 DAA Nodes

- ~80% Pass – MS Ready
- ~20% not MS ready due to the following reasons:
OFDMA Blocked (likely drop amp), risk of video interference, test execution failed, various error codes



When iHAT executes, devices unable to connect to OFDMA consistently (“partial services”) are reverted to SC-QAM only



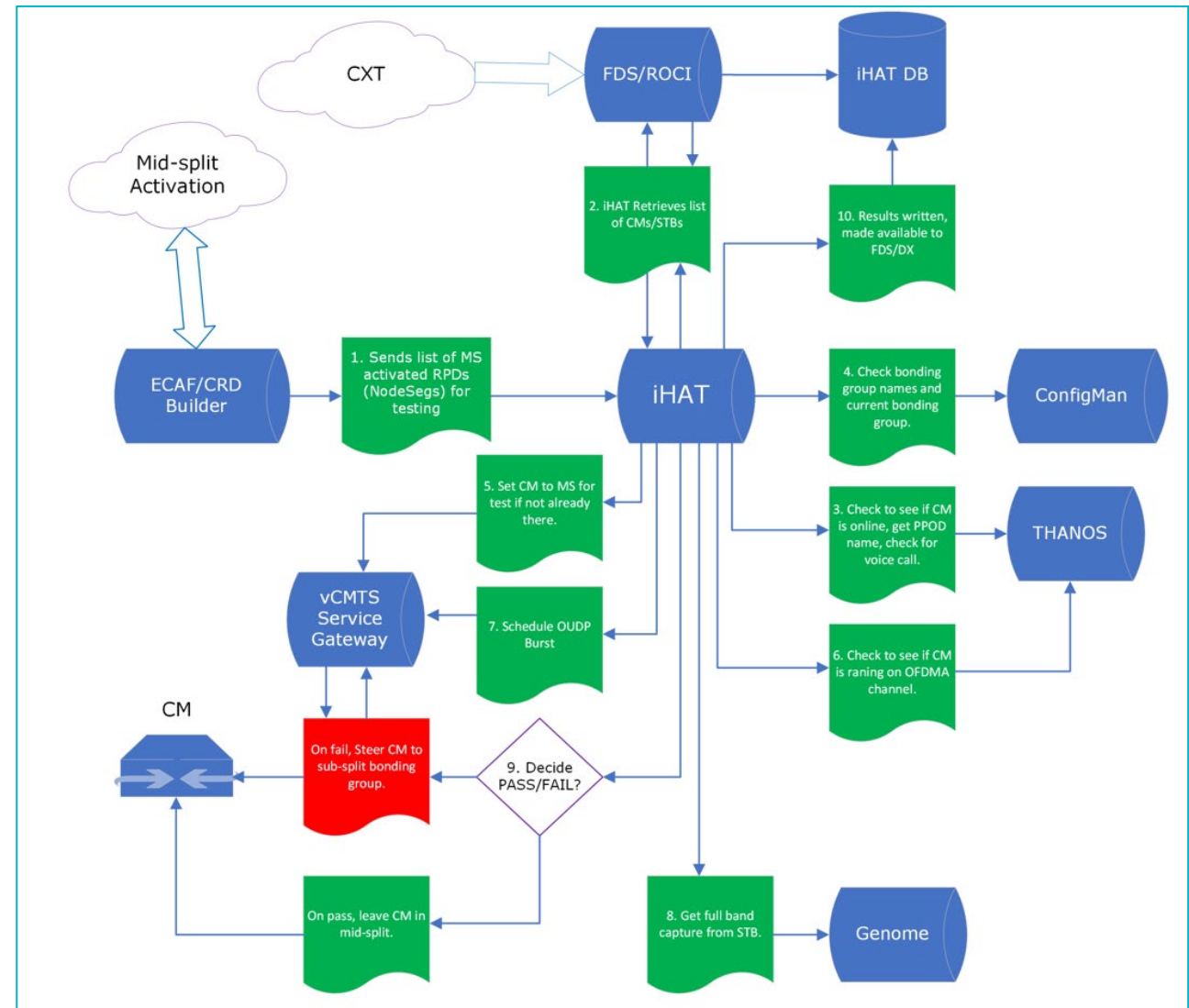
Embedding iHAT into a Production Ecosystem

Feature iHAT Upgrades

- “Hitless”
- Event-driven
- Maintenance sweeps
- Technician tool access
- System plant diagnosis

APIs and DB access for Automation and Scalability

- Construction tools
- Account mgmt – devices present
- vCMTS – MS activation mgmt
- Technician tools
- Device state and telemetry





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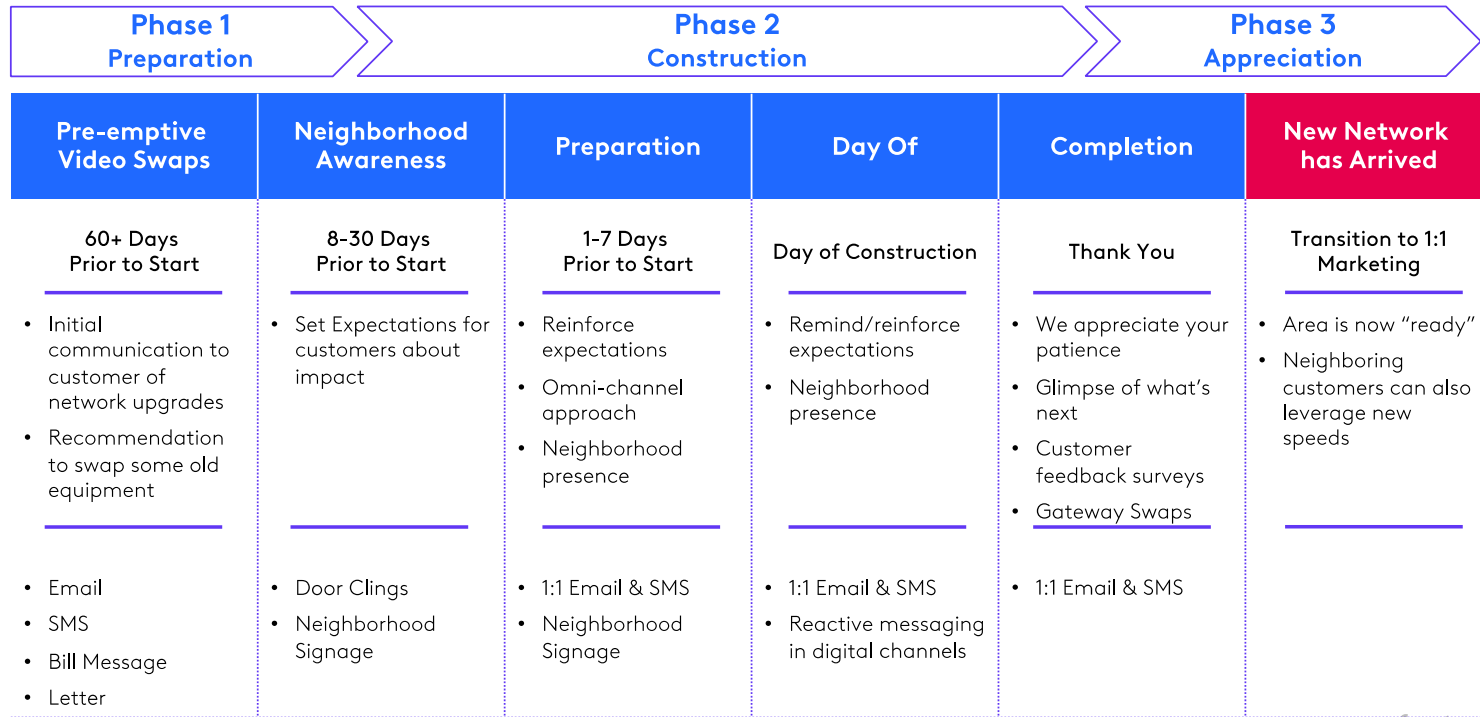
iHAT Integration With Production Systems

iHAT and its surrounding ecosystem looks great on paper – BUT how do you integrate it into the real world of operations and customers?

The Three Phases of The Customer Journey

PROCESSES: CUSTOMER COMMUNICATIONS

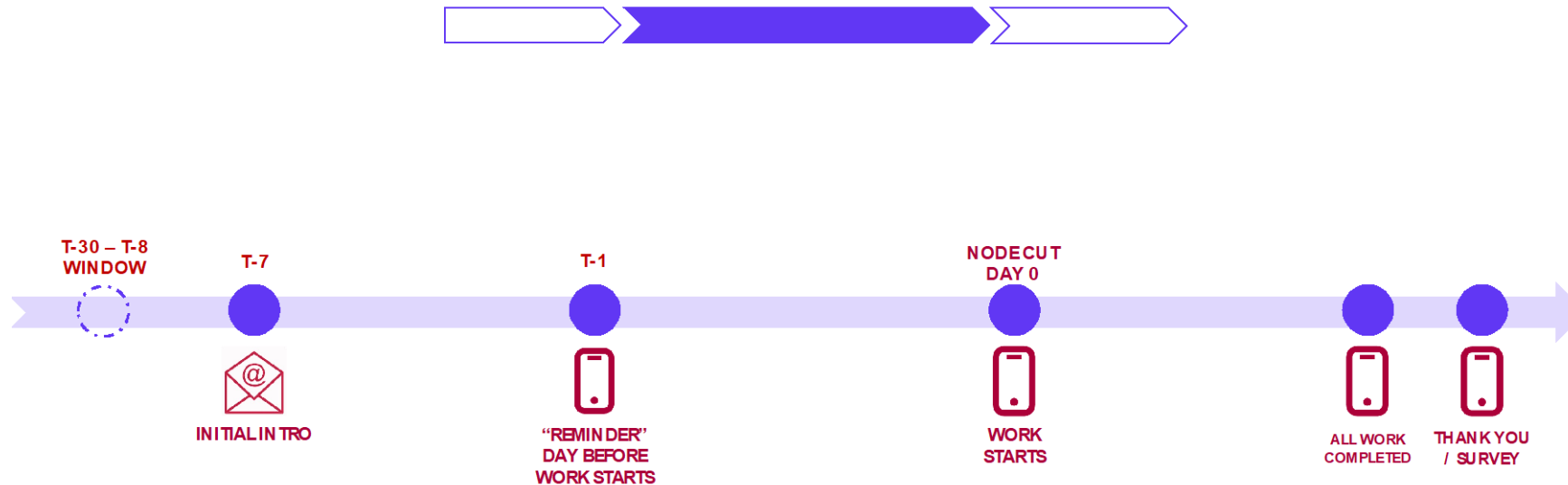
In an effort to convey reliability and to deliver a seamless customer experience, we're looking holistically across the customer lifecycle.



Customer Communication

PROCESSES: CUSTOMER COMMUNICATIONS

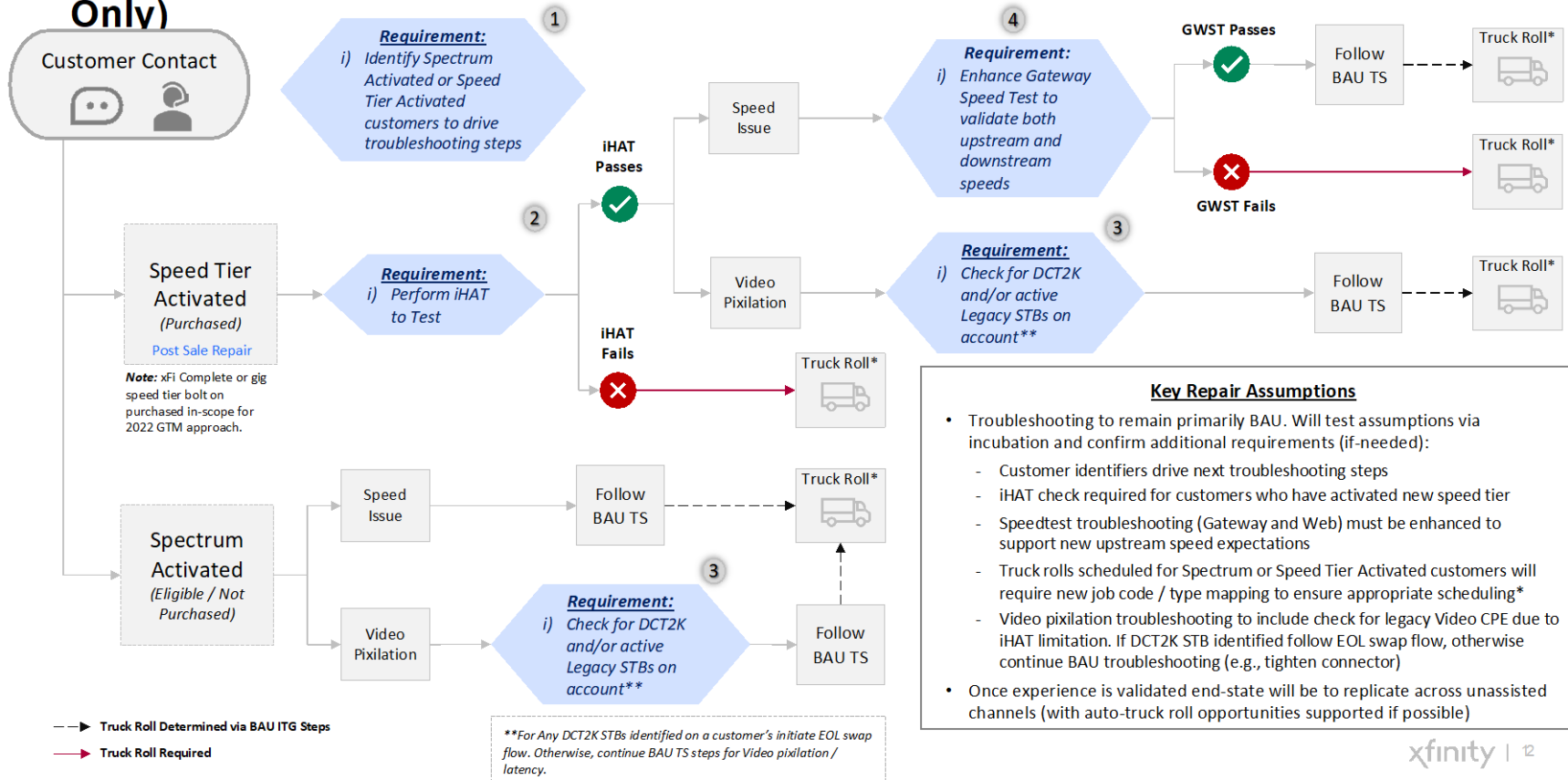
Proactive Communications journey – happy path of comms indicated by purple touchpoints



Customer Remediation Journey

CXSO RELIABILITY STRATEGY

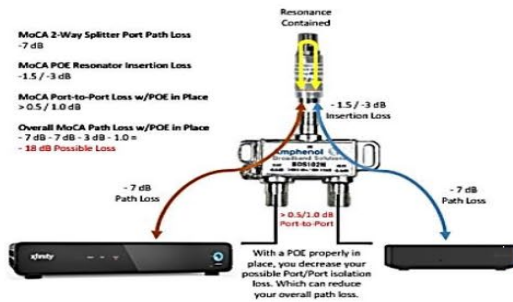
Genesis Overview – Prelim Repair Strategies (Spectrum & Speed Tier Activation Only)



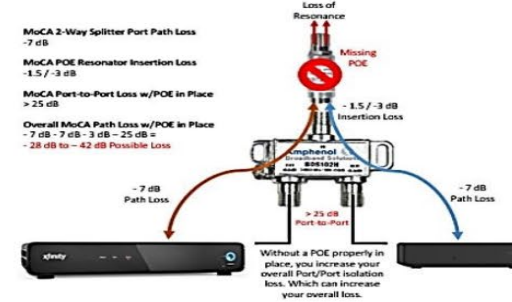
Hardware

TOOLS OF THE TRADE: HARDWARE

Keep homes as passive as possible and only use an amplifier when absolutely necessary



Secondary—MoCA DOCSIS Passive



Tertiary—Mid-Split MoCA Unity Gain Amplifier



Please note most amplifiers can be easily identified as being Legacy, MoCA or Mid-Split Capable compliant by the colored labeling.

TOOLS OF THE TRADE: HARDWARE

XM Capabilities Matrix

	XM1- 2016	XM2 - 2019	XM2M - 2021
DOCSIS Ds Capability	D3.0 4x SC QAM	D3.132x SC QAM + 2 OFDM	D3.132x SC QAM + 2 OFDM
Ds Spectrum Visibility	50-1002 MHz	50-1212 MHz	50-1212 MHz
DOCSIS Us Capability	4x SC QAM	8x SC QAM + 2 OFDMA	8x SC QAM + 2 OFDMA
Us Spectrum Diplex	5-65 MHz Fixed	5-42 / 5-85 MHz Diplex	5-42 / 5-85 / 5-204 Triplex
Ingress Widget Bandwidth *	5-125 MHz	5-125 MHz	5-204 MHz
Speedtest Bootfile	N/A requires XMT Odroid side car	d11_m_cgndp3_2g250m_c05.cm	d11_m_cgndp3_3g2g_c05.cm
Ethernet Capability	100Mbit	1000Mbit	2500Mbit

XM2 recommended for Mid-Split areas

* Noise and Ingress can be measured across the entire meter bandwidth using DS Spectrum widget

The Mid-Split OFDMA Ramp is Underway !

Upgrading to Mid-Split delivers both long-term capacity growth and new broadband speeds for residential and business customers

The HFC network has been built and operated as a Low Split architecture since inception

The upgrade challenges to overcome are well understood and characterized

Tools and processes have been built and deployed, and operational practices aligned to launch DOCSIS 3.1-based OFDMA Mid-Split

Currently executing a large-scale plant upgrade covering 10's of millions of HHP in the next few years – stay tuned for future readouts on progress and more lessons learned !





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Thank You!

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