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Cloud & Virtualization

Rapid and Automated Production Scale Activation of Expanded Upstream Bandwidth: Diagnosing Plant Health from the Cloud

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2021 Fall Technical Forum
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VIRTUAL EXPERIENCE
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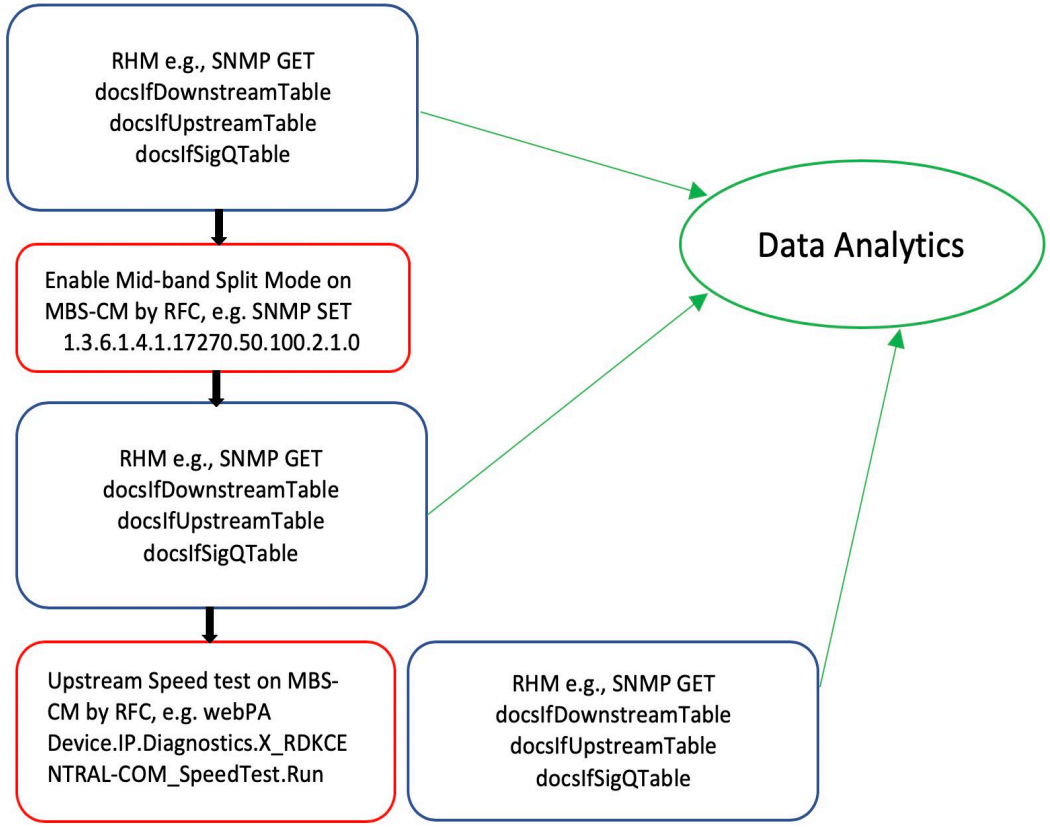
Past iHAT Implementation – Proof-of-Concept (Trial) Tool

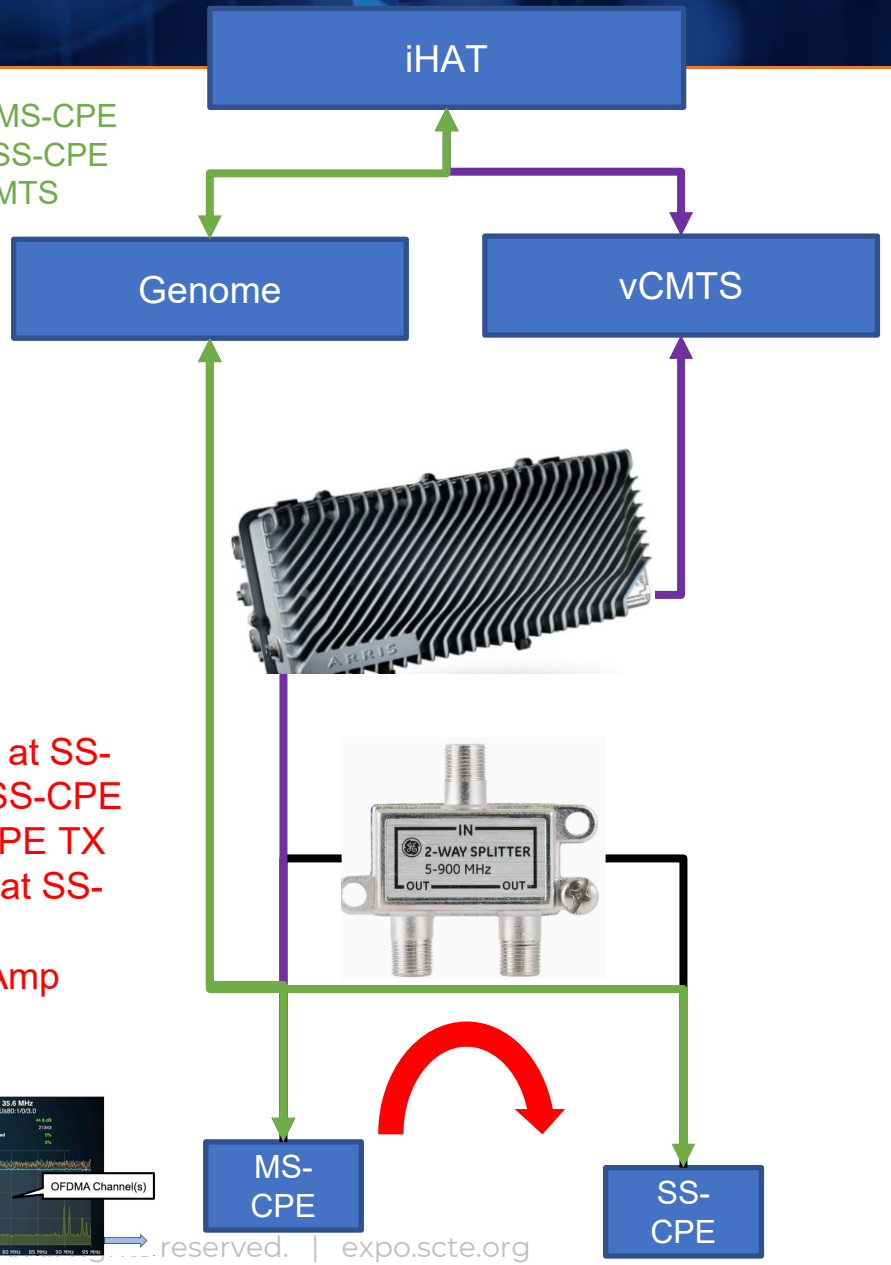
L. Zhou, "A Proactive Network Management Scheme for Mid-Split Deployment", SCTE Expo, 2020



1. Preconfigure CMTSs with midsplit
2. Baseline candidate STBs
3. Reconfigure candidate gateways to midsplit, includes reset
4. If midsplit partial service, FAIL and revert candidate gateways low-split
5. If STBs degrade at all during speedtest, FAIL and revert candidate gateways to low-midsplit

iHAT Present – Scaling with OFDMA Upstream Data Profile (OUDP)

- Collect TX Power from MS-CPE
- Collect Spectrum from SS-CPE
- Partial Service from vCMTS



Three Metrics Calculated

- DS OFDMA Interference at SS-CPE - DS RX Power at SS-CPE
- In-Home isolation, MS-CPE TX Power – OFDMA Power at SS-CPE
- Partial Service – Home Amp

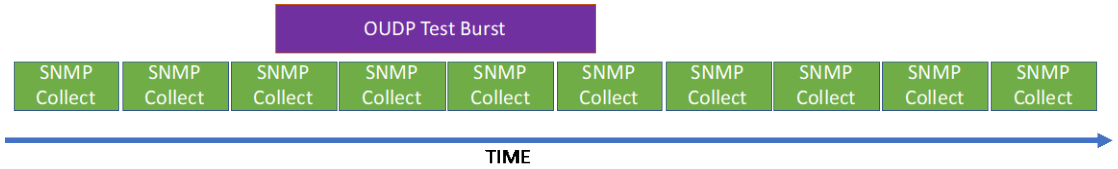
US TX from MS CM

OUDP Test Request

```
var oudpRequest = {
  transaction_id: tid,
  mac_address: { address: my_cm_mac },
  ofdma_channel: 0,
  iuc: 13,
  center_frequency: 79900000, // 79.9 MHz
  width: 1599999, // 1.6 MHz
  duration: 5000 // 5 sec
};
```

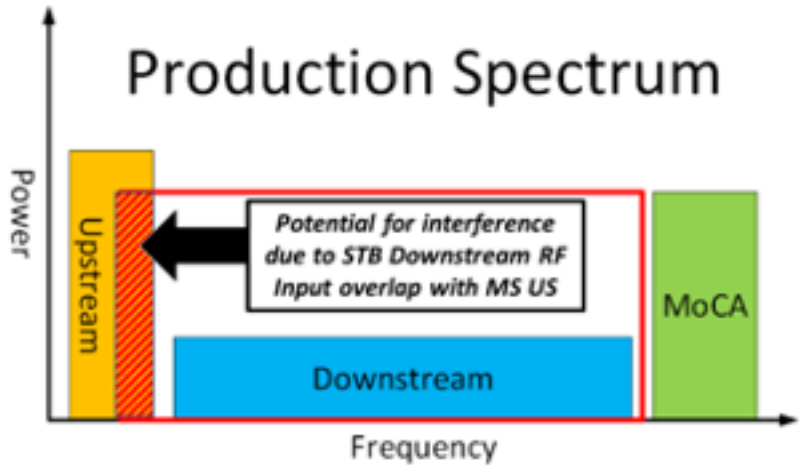
OUDP Test Response


```
{
  "mac_address": {
    "address": "60:3d:26:ab:b5:ec"
  },
  "ofdma_channel": 41,
  "iuc": 13,
  "sid": 8198,
  "tss": "1621964215804",
  "actual_grant_duration_msec": 4999,
  "center_frequency": 79900000,
  "width": 1600000,
  "actual_cm_transmit_duration_msec": 4999
}
```

OUDP burst 3 seconds

5 spectrum samples capture OUDP energy at SS-CPE



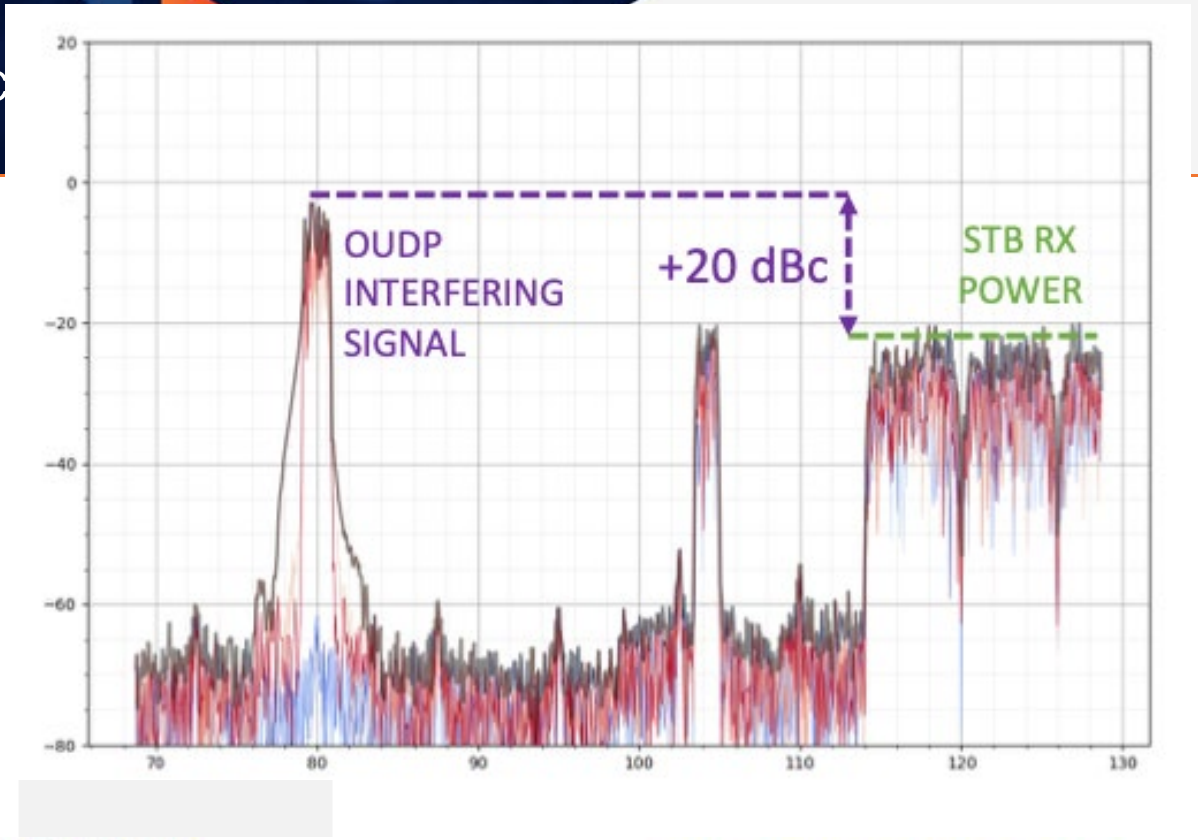
Spectrum-Based Adjacent Channel Interferenc

OUDP Test Signal created on vCMTS

- Tested successfully on major MS-CPE models
- 1.6 MHz for 3 sec., not service impacting

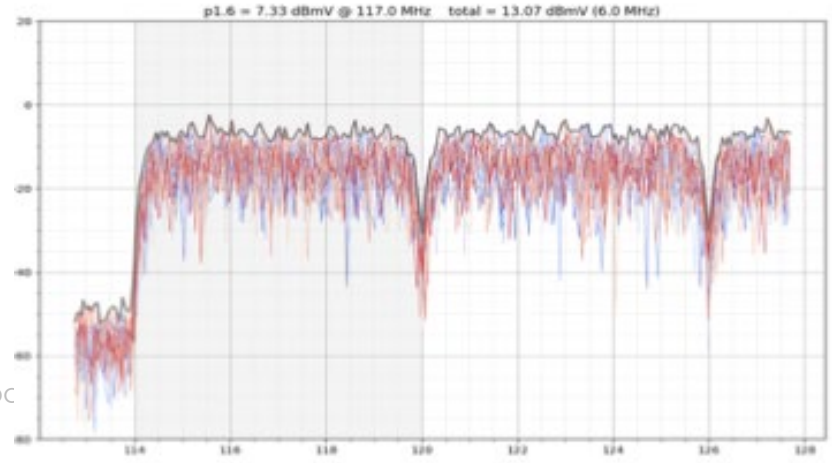
Genome collects FBC data from STB and TX Power MIB from CM

- 7.5 MHz for OUDP 1.6 samples/sec
- 58 kHz RBW
- 15 MHz for DS RX 2-samples
- All power normalized to 1.6 MHz



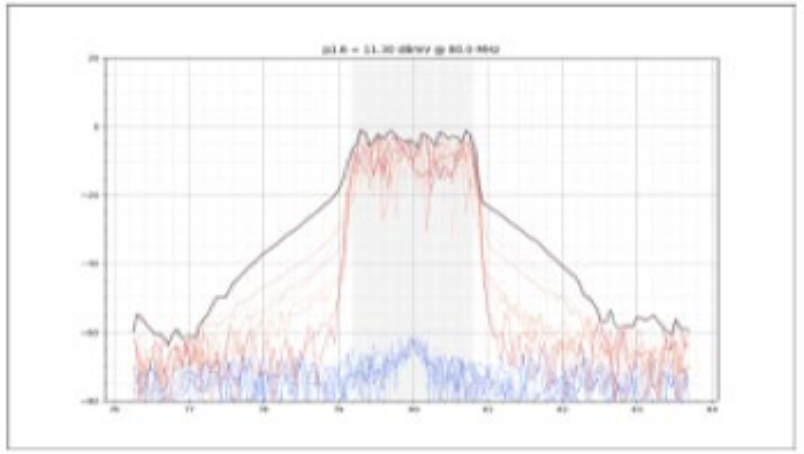
STB RX POWER

15 MHz Measurement



OUDP INTERFERING SIGNAL

7.5 MHz Measurement



Midsplit Upstream Spectrum Launch (MUSL)

Customer Accounts – Serviceability: recognize the iHAT status of the home and trigger an instant iHAT test for an updated result.

Biller – new CPE: When a customer changes CPE, possible iHAT variables that are affected at the devices DOCSIS capabilities

XOC – Job Scheduler: When a home "fails" iHAT, it goes into a remediation queue

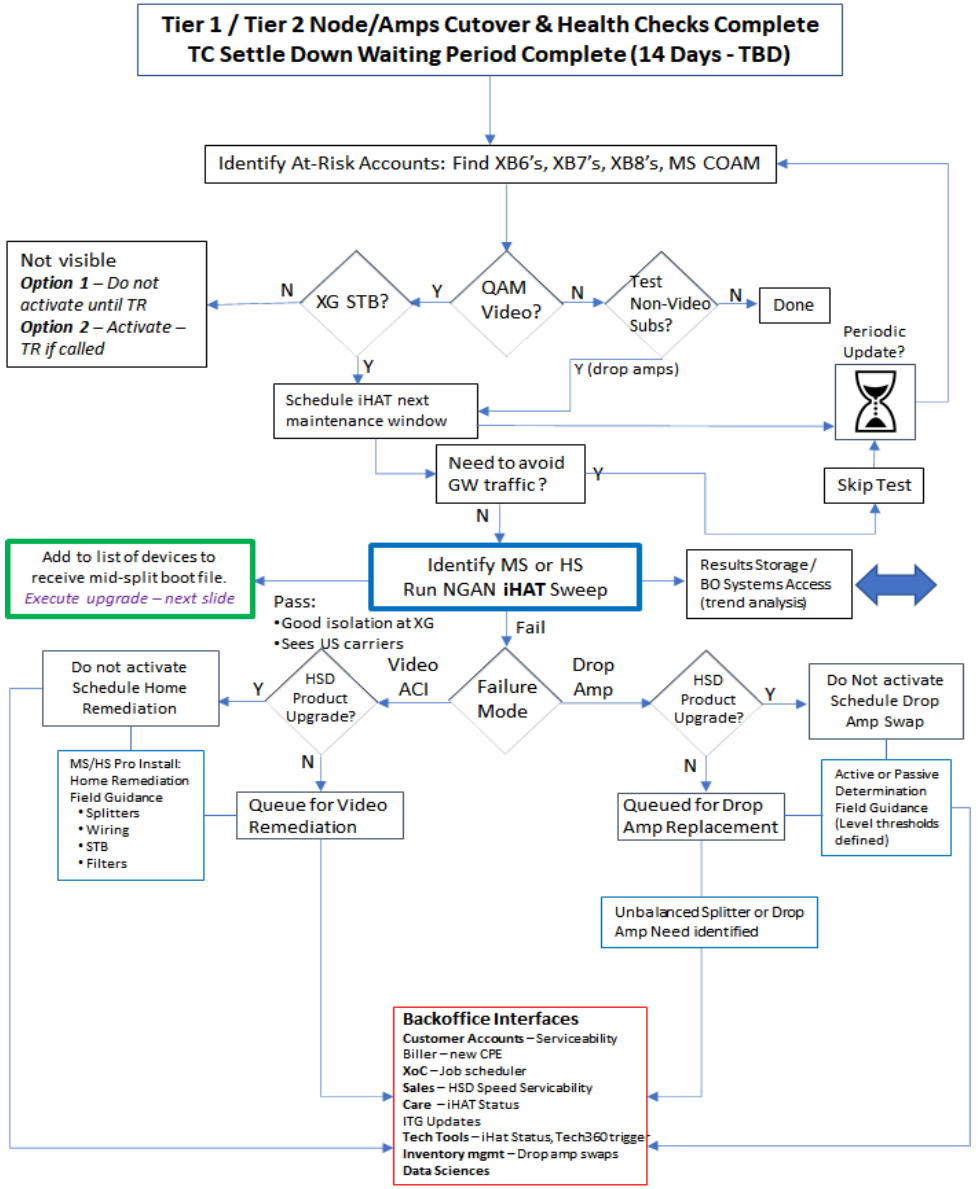
Sales – Serviceability – Similar to Customer accounts, sales representatives should be able to quickly assess whether a customer, such as an MDU property, is eligible for MS speeds

Care – iHAT status, ITG Updates: the possibility of the issue being MS-related should be considered

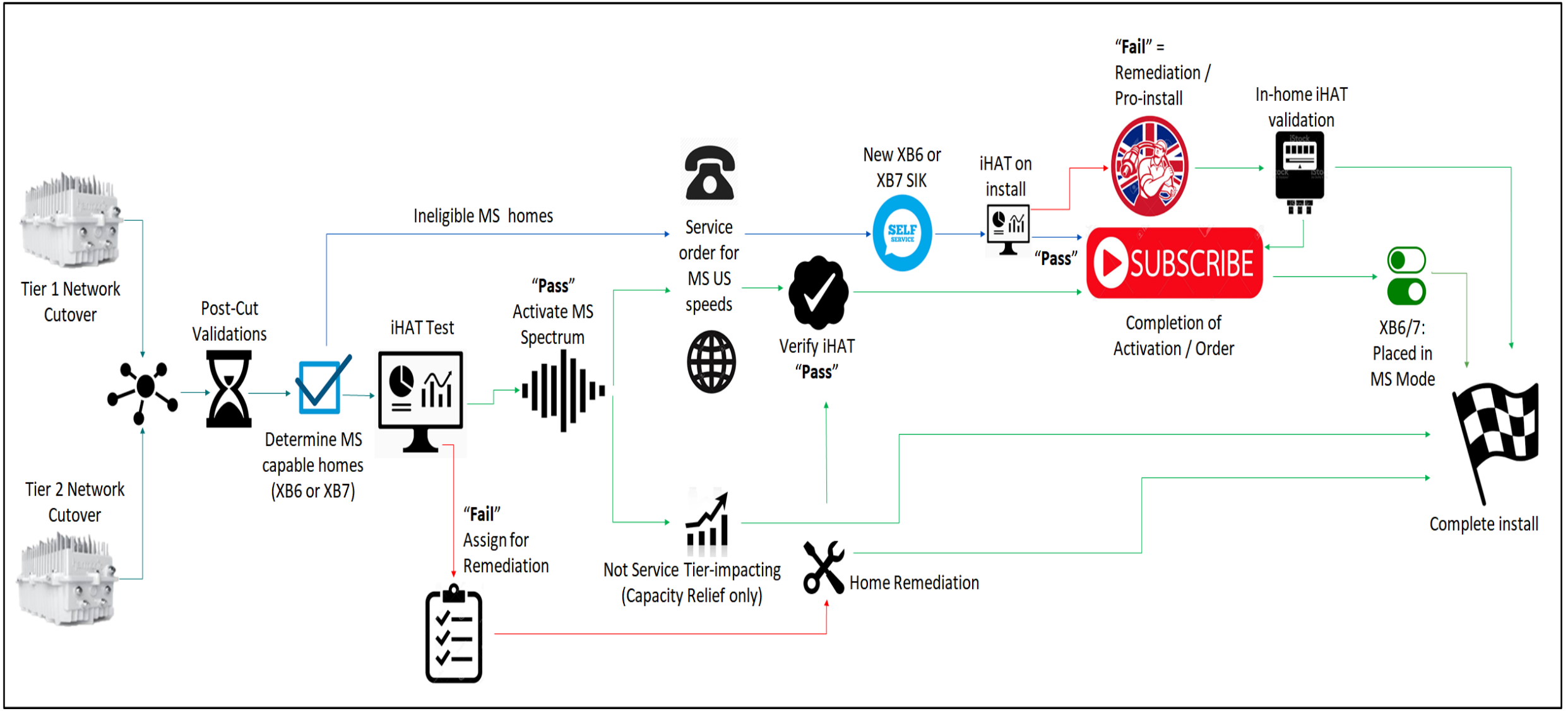
Tech Tools – Tech360: Like Care, when a tech is enroute or onsite to a customer home, part of the awareness the Tech should have is the MS status of the node, and the iHAT status of the customer

Inventory Management – procurement awareness to the deployment of alternative solutions can ensure the supply pipeline is tracked and cared for

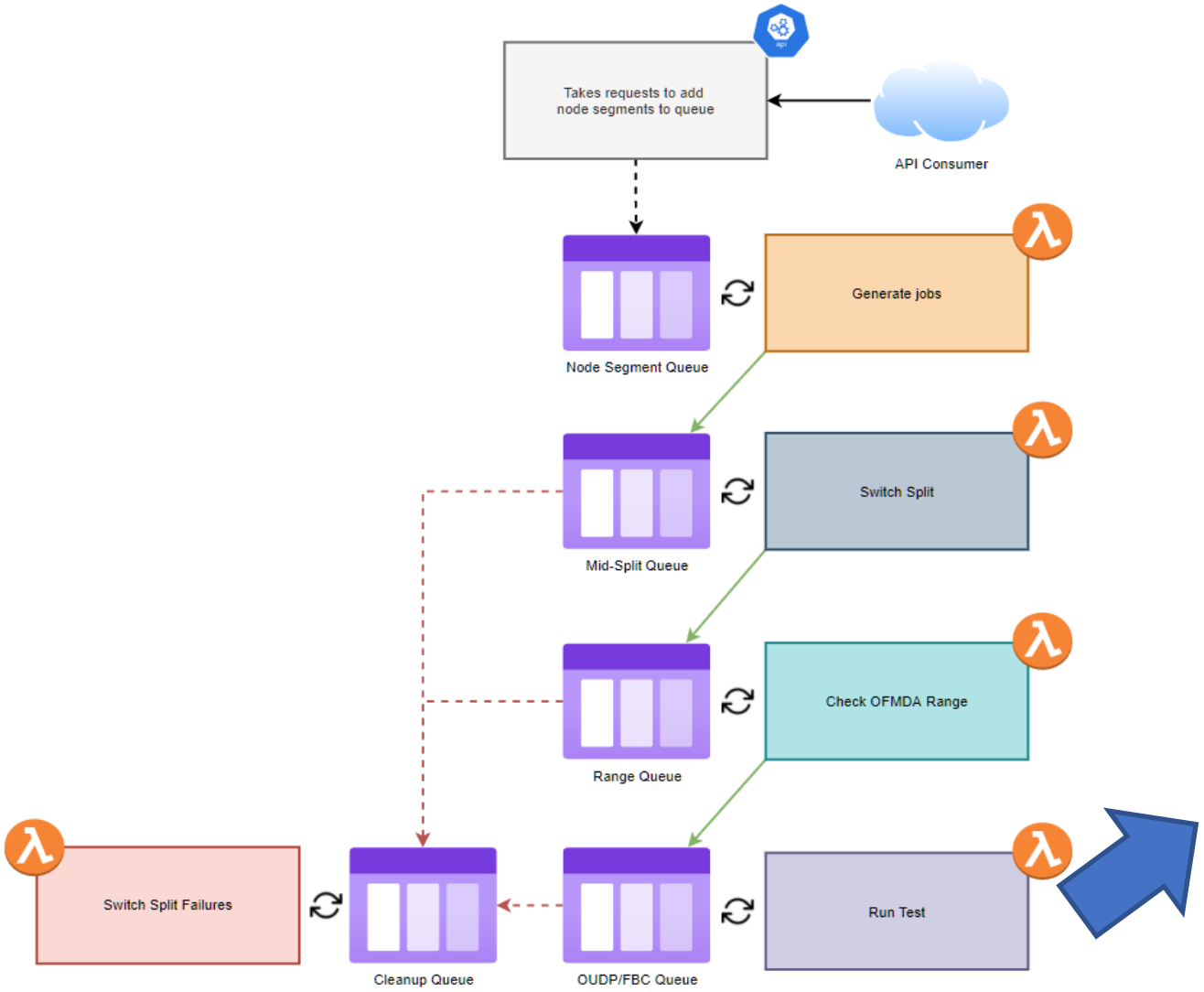
Data Sciences – As iHAT data is accumulated, new information can be stored and processed for future optimizations and to estimate future process implications and costs.



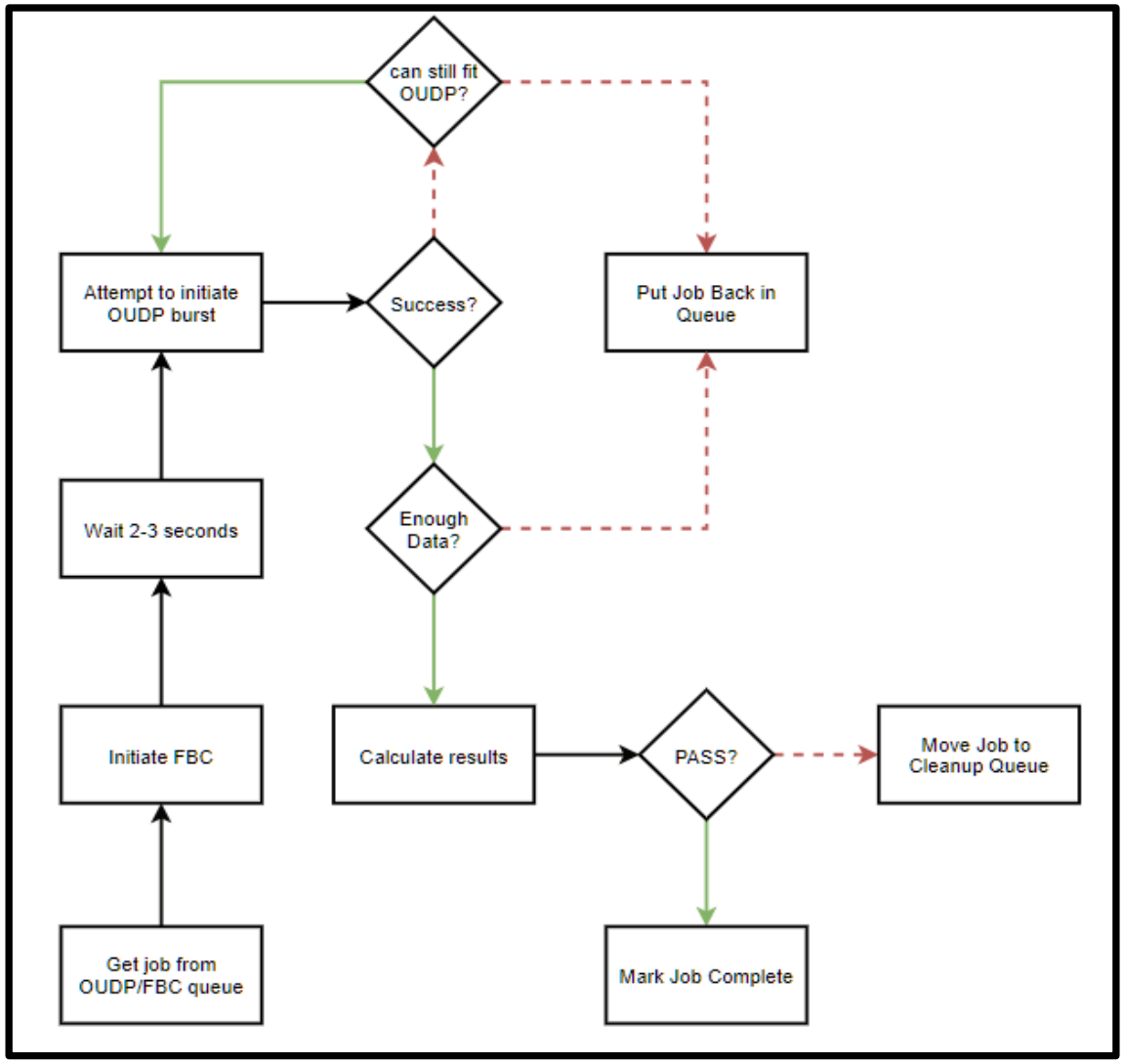
Simplified Mid-Split Activation Flow: Cutover through to Activation



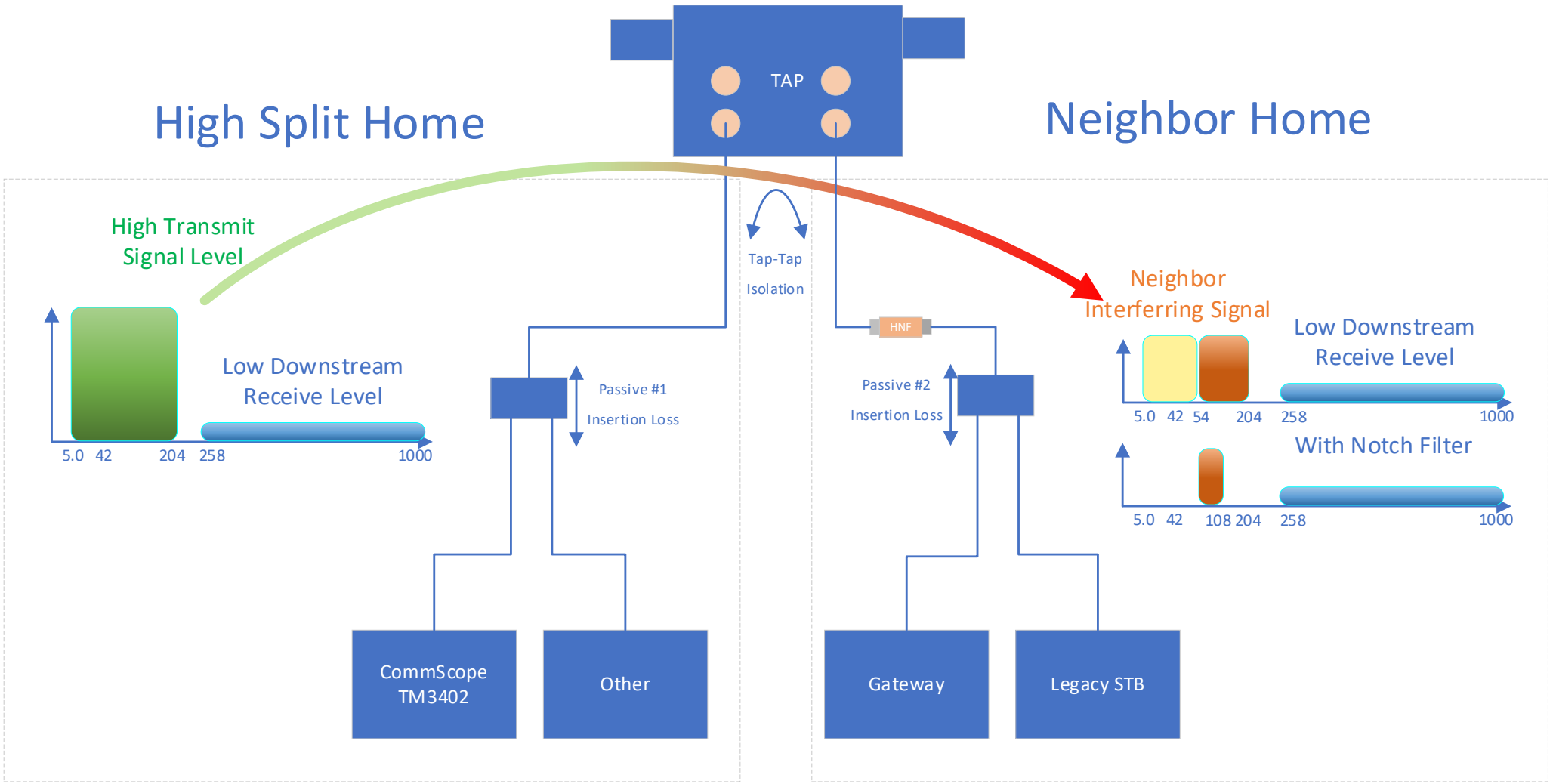
AWS-Based iHAT System Architecture



MS-CPE to SS-CPE Interference Level Test



iHAT Future – High Split Neighbor Interference



Presented a view of iHAT Past, Present and Future

- Past with a proven tool and usefulness in obtaining information on two new operational parameters associated with enhancing upstream spectrum
  - MS-CPE to SS-CPE Isolation and Leakage
- Present focus on scale requirements, starting with a generally accepted object model representing critical iHAT attributes
  - Midsplit capability, iHAT PASS, remediation details, etc.
  - Leverages proven data collection, query, and authentication tools
  - Distribute critical iHAT information to downstream applications and “need-to-know” teams
- Future expansion of iHAT processes to even higher capacity upstream using high-split and expansion of new operational parameters to neighbor interference problem

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Thank You!

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