

# Experiences from large scale Edge GM deployment

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# Customer X

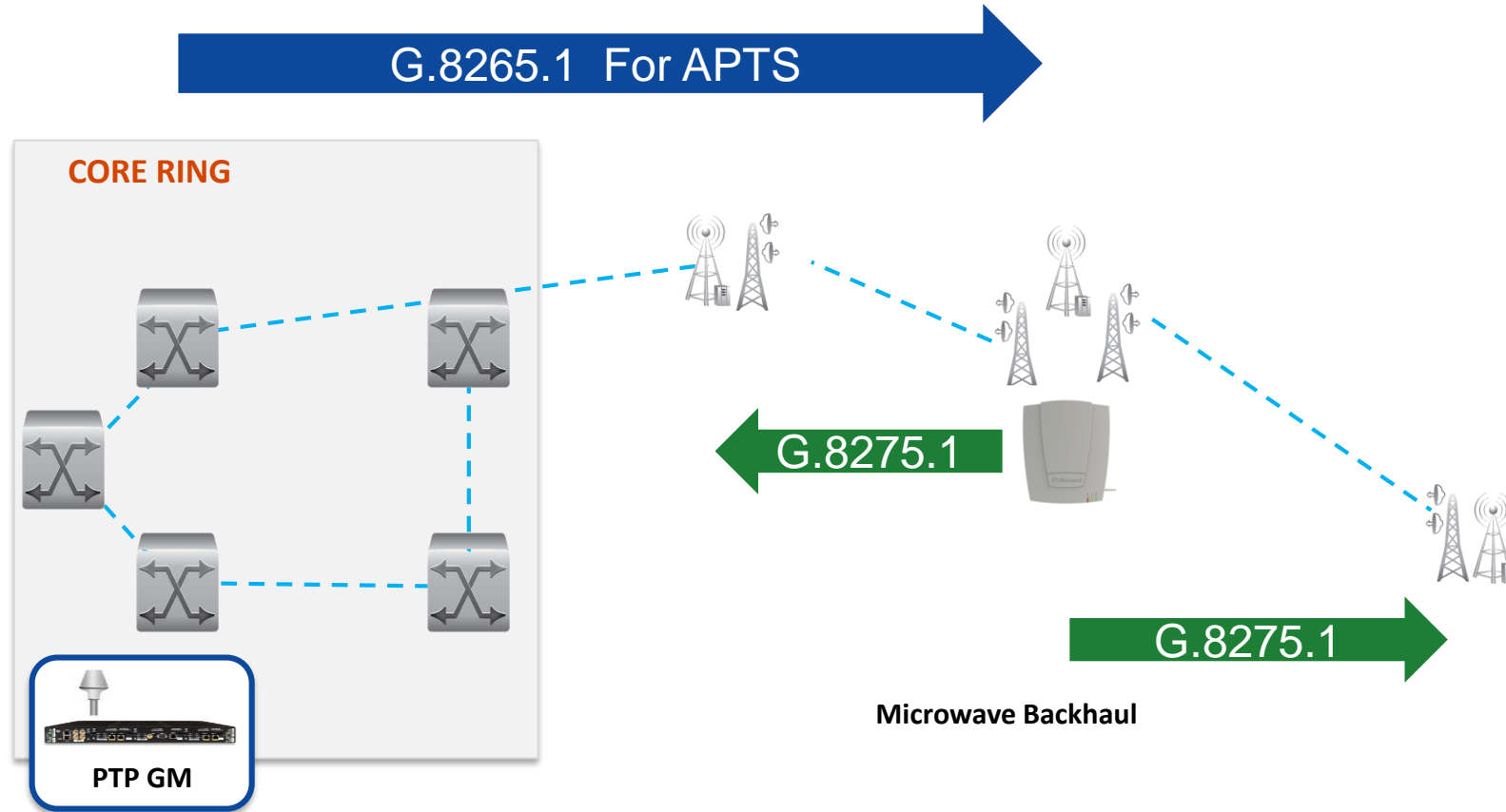
- Phase Rollout started early 2017
  - Hundreds of sites deployed to date.
- eNB only would accept G.8275.1
- Backhaul network did not fully support g.8275.1
- Existing PTP Frequency Core using G.8265.1
- Most locations presented issues with GNSS antenna install
  - Effort, Theft and Vandalism
- Target requirement for better than  $0.6\mu\text{S}$  at the eNB

# Rule based Provisioning and Management

- Zero Touch Provisioning
  - Hundreds of devices, cannot be manually configured
  - Unskilled installs possible
  - Field Replacement, faster, less skilled
- Auto assignment of Name, Region and PTP setup
- Customer requirement was to Connect any unit out the box, no need for Serial or Back to Back ethernet any more.
- Reduced customer OPEX for deployment and support.

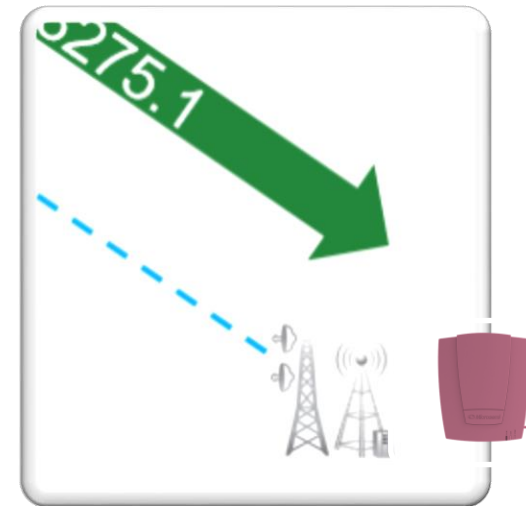
# Customer Deployment Layout

- MPLS Core with Microwave backhaul for access



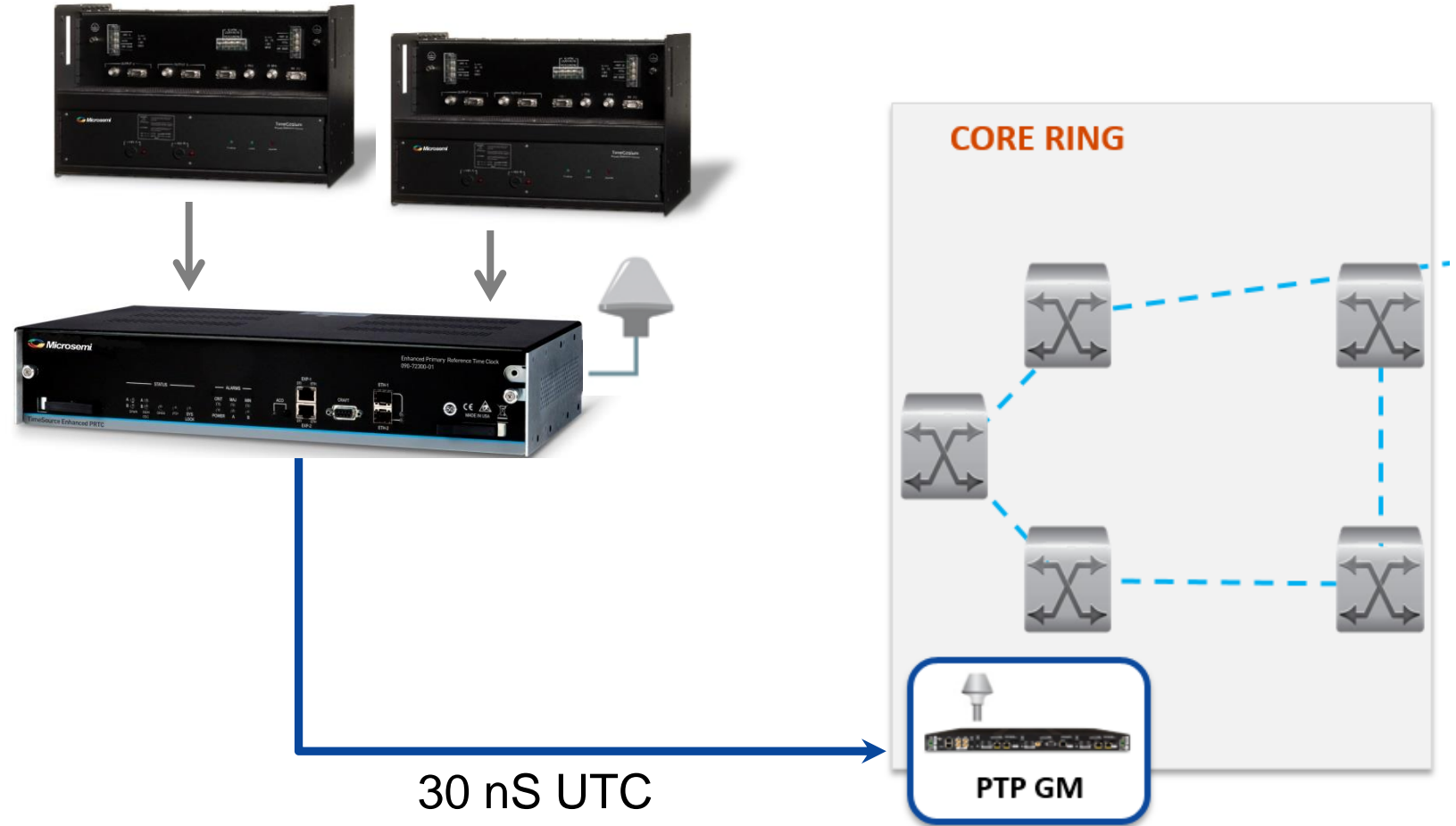
# Phase Performance Monitoring

- Customer has 2 Monitoring scenarios
- APTS
  - Only one Metric matters
  - No point providing stats that need a “boffin” to understand
  - Analysis needs to be implemented where the answer is
- SLA – Endpoint
  - Report asymmetry at the site
  - Long Term deployment prohibits use of specialist equipment
  - Fpp to “predict” eNB performance



# Later Plans for Protection ePRTC

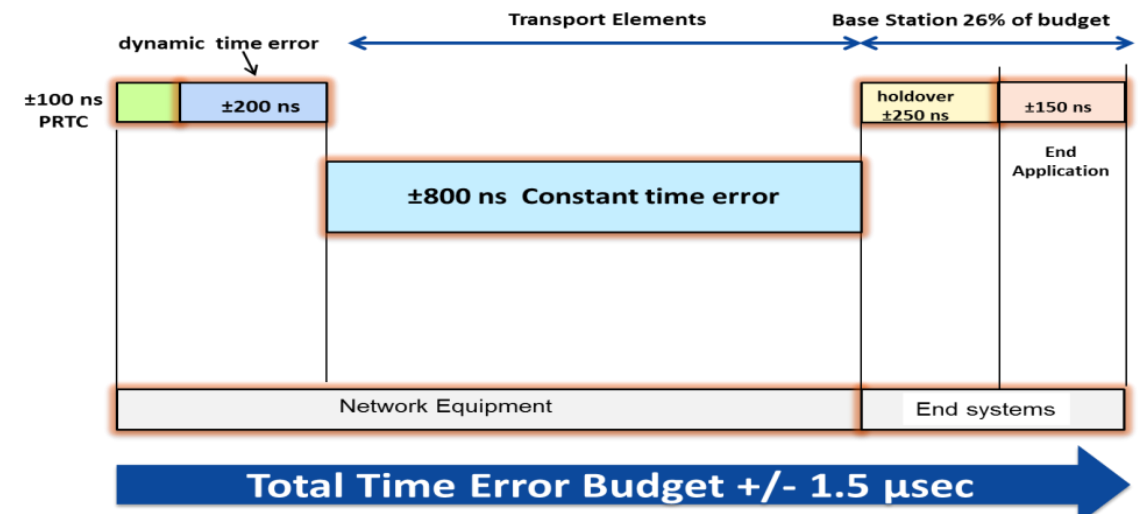
- The Existing PTP Frequency deployment is being repurposed to provide backup for the new Phase updates
- Long Term Holdover and immunity from GNSS jamming is very attractive



# Holdover

- Phase Holdover budgets are tiny
- Orders of magnitude different from a frequency network

Oscillator	stability	250nS
Stratum 3e	1e-8	Minutes
OCXO	1e-10	3 hours
Rubidium	5e-12	20 hours
G.811 Cs	1e-12	3 days
5071	5e-13	6 days
ePRTC	6e-14	50 days



# Summary

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- The right Management tools dramatically reduce installation and operational costs
- Not requiring traditional exterior antennas reduced costs and concerns about vandalism
- A low cost, multi function device proved invaluable to rolling out phase.
- Re-purposing and hybridising existing PTP networks provided easy migration path