

Building the Business Case for 60 GHz Fixed Wireless

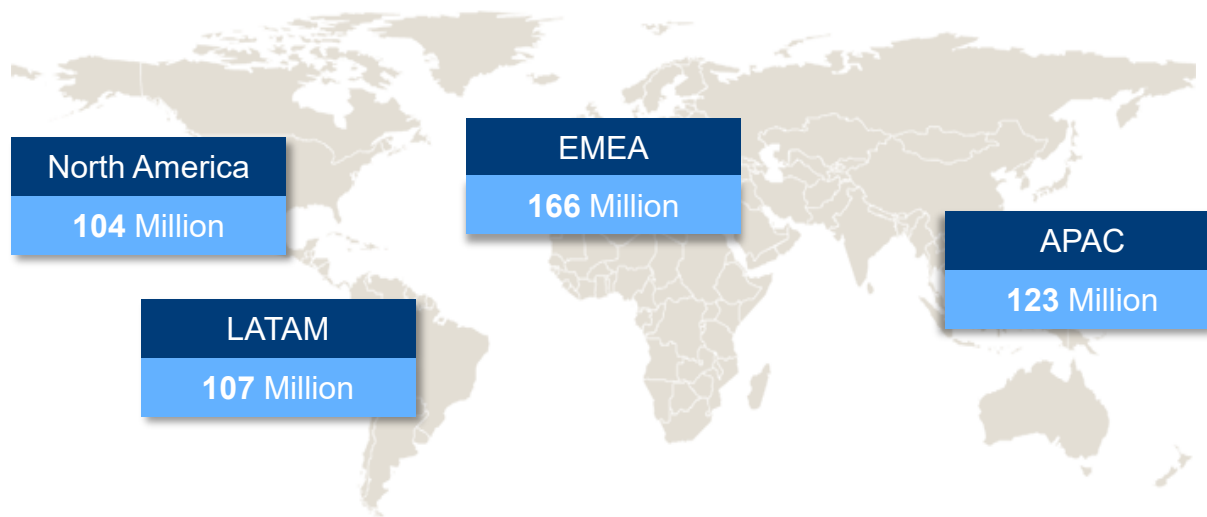


Cambium Networks™

Presenters:

- Praveen Sampath, Product Manager, Facebook Connectivity
- Allen Yu, Director Product Management, Cambium Networks
- Ray Savich, Director Marketing, Cambium Networks

High speed broadband addressable market is ~500M subscriptions over next 5 years



Source: Facebook Sept. 2020

High penetration markets

NA, EU, NE Asia, AUS, NZ

- Existing subs upgrading to higher speed (>100 Mbps)
- Enterprises upgrading to symmetric gigabit speeds
- Mostly connected to non-scalable copper last mile

Lower penetration markets

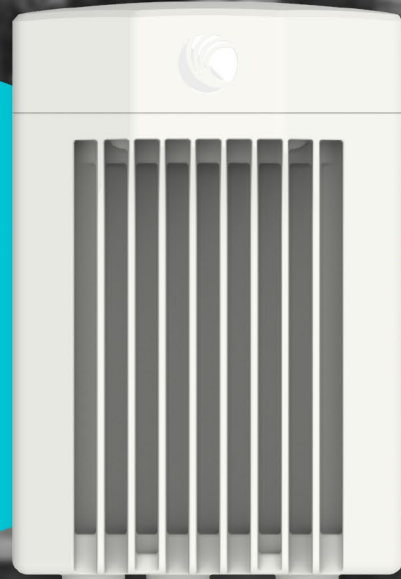
LATAM, S. Asia, Africa

- New fixed subscribers switching from mobile only
- Higher ARPU subs that need gigabit connections
- Residential customers moving to > 50 Mbps tier

Cambium 60 GHz cnWave



Distribution
Node
V5000



terragraph
certified



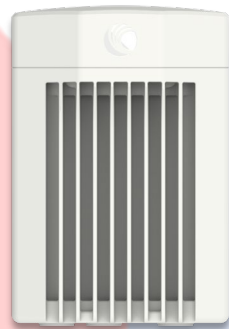
Client
Node
V1000



Client
Node
V3000



- **Standards:** 802.11ay standard, Mesh support, Terragraph certified
- **Performance:** Up to 15.0 Gbps with channel bonding
- **Installation:** Bi-directional auto beam forming
- **Operation:** Auto expansion, auto healing with Mesh support
- **Configuration:** Point-to-Point, Point-to-MultiPoint, Mesh
- **Management:** cnMaestro™



Sector 1

Sector 2

Frequency: 57 to 66 GHz

Modulation: BPSK to 16 QAM (MCS 0 to MCS 12) with ACM

Throughput:

- 1.9 Gbps Uplink + 1.9 Gbps Downlink per sector
- 3.8 Gbps Uplink + 3.8 Gbps Downlink with channel bonding* per sector

Coverage: Dual Sector 280 Degree Coverage with Beam Forming

Configurations: Up to 30 CNs or 4 DN + 26 CNs

Latency: < 1 ms

Suburban deployment



DN-DN



DN-CN



Wi-Fi

Suburban Deployment



Roof Top to Roof Top



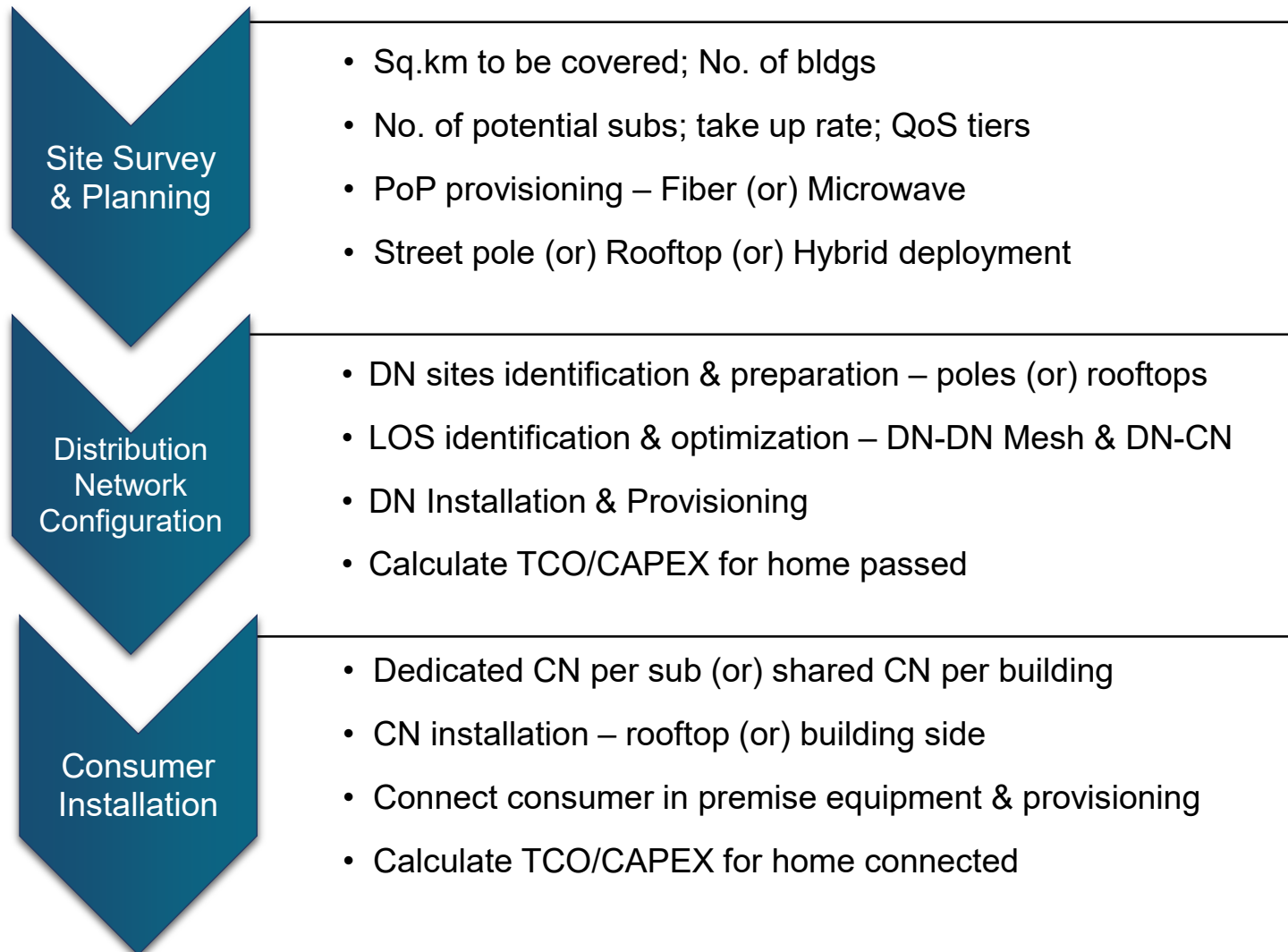
DN-CN, PMP with Mesh



Wi-Fi

Poll Question





Design Challenge - Example

Problem:

- 100% coverage
- Offer 100 Mbps to 250 Mbps plan
- Up to 40% take rate



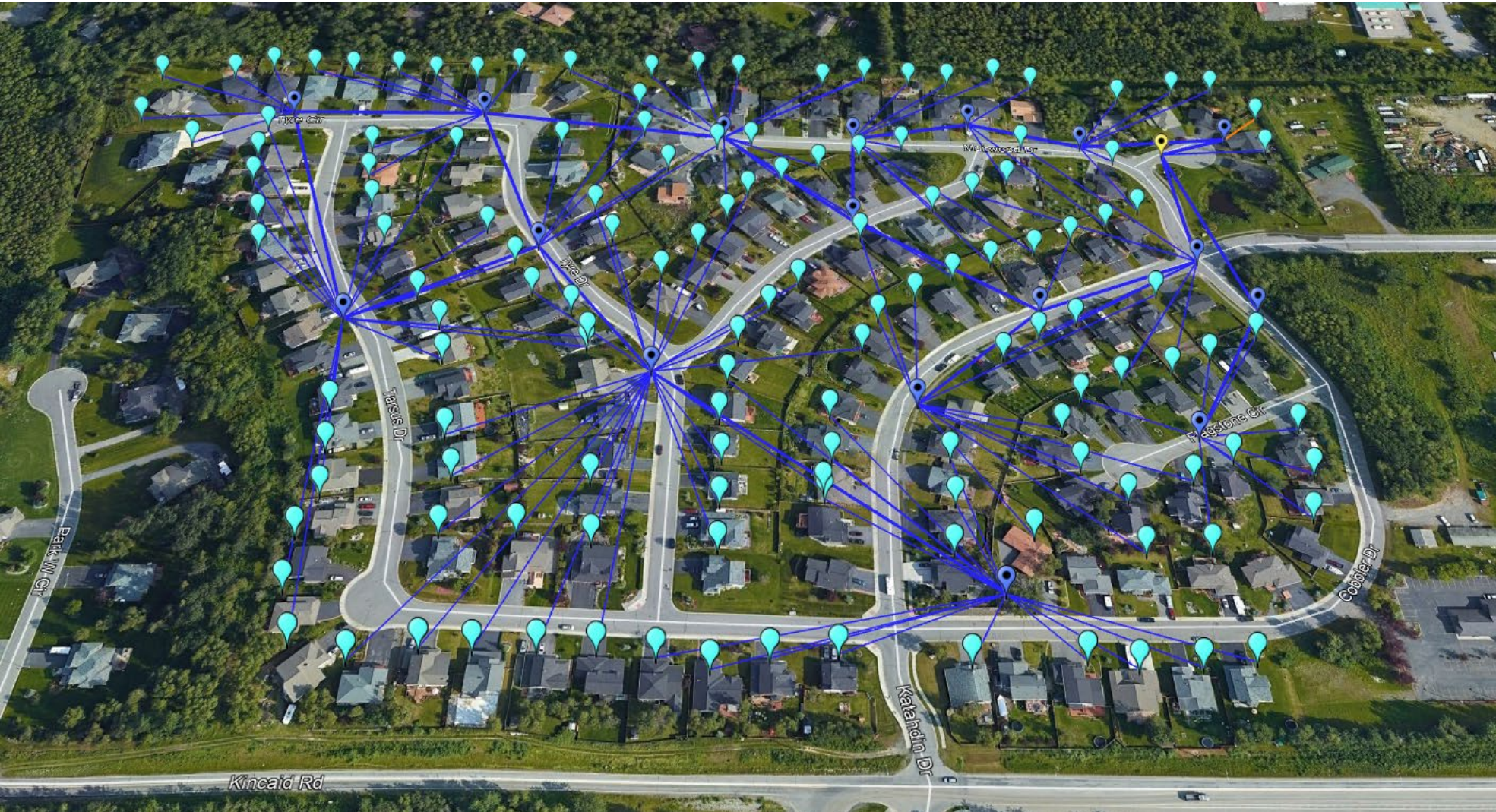
Solution:

- cnWave to provide 100% coverage
- PMP with Mesh

Distribution Network Configuration Illustration



Consumer Installation Illustration



Tx Site Geohash	acr7eqdpi9
Rx Site Geohash	acr7eq6prk
Status	PROPOSED
Distance	157.7
Data flow (Gbps)	0.00
Throughput (Gbps)	0.65
Utilization	0.0%
Tx Beam Azimuth	207.3
Rx Beam Azimuth	27.3
Deviation from Tx Boresight	35.9
Deviation from Rx Boresight	0.1
Deviation from EI Boresight	3.9
Tx Altitude	10.0
Rx Altitude	17.7
Estimated MCS	8
Estimated SNR (dB)	11.9
Estimated SINR (dB)	11.9
Estimated RSL	-59.1
P2MP	True
Outages caused	2
Nb times on MCS route	2

Poll Question



FTTH vs cnWave TCO comparison

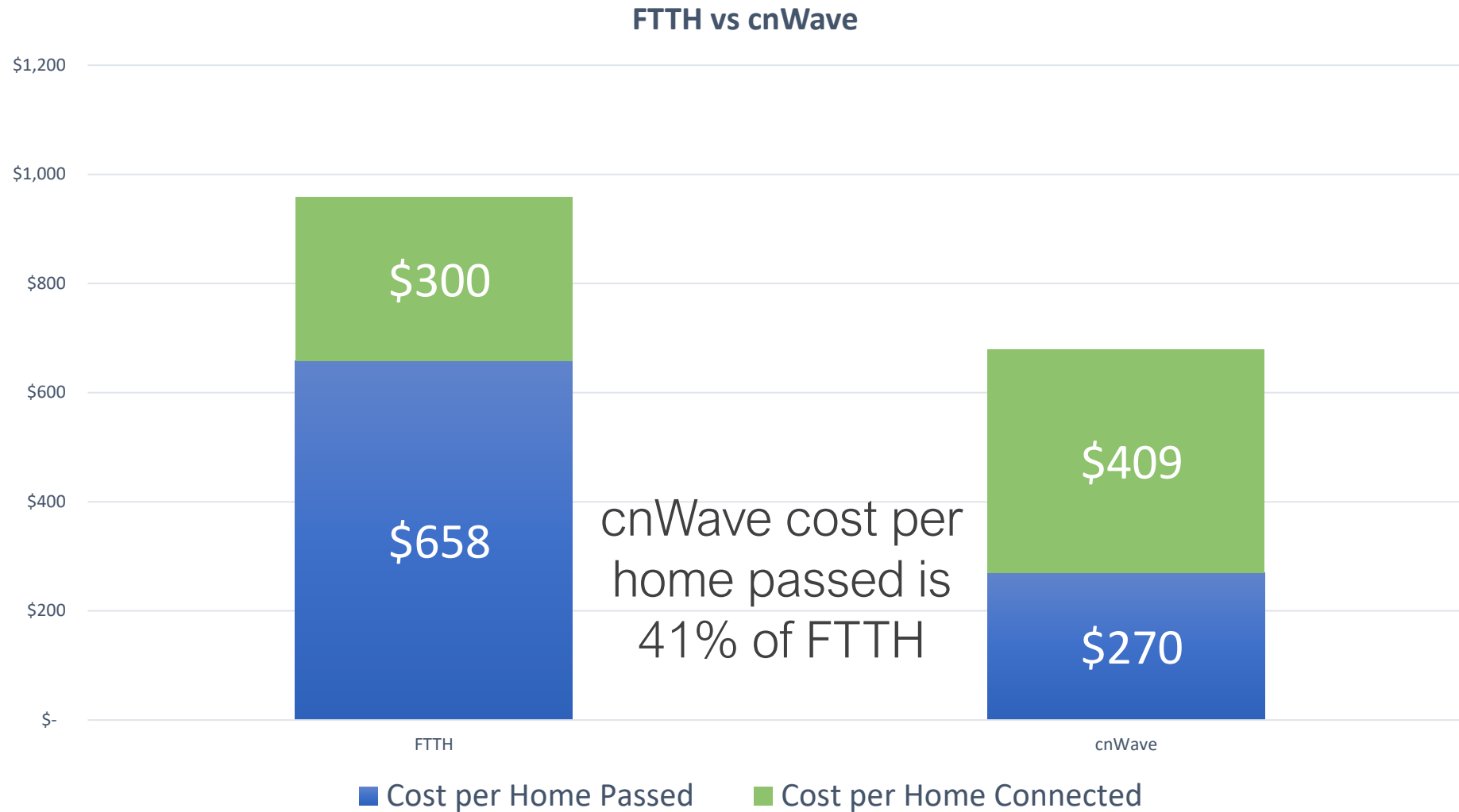
FTTH - Home Pass Breakdown	
Closures	\$20,200
Cabinets	\$16,000
Cables	\$73,245
Trenching	\$91,968
Total	\$201,413
No. of subscribes/homes	306
Cost/Home Pass	\$658

FTTH - Home Connection Breakdown	
ONT Cost	\$45,900
Fiber termination and installation	\$45,900
Total	\$91800
No. of subscribes/homes	306
Cost/Home Connection	\$300

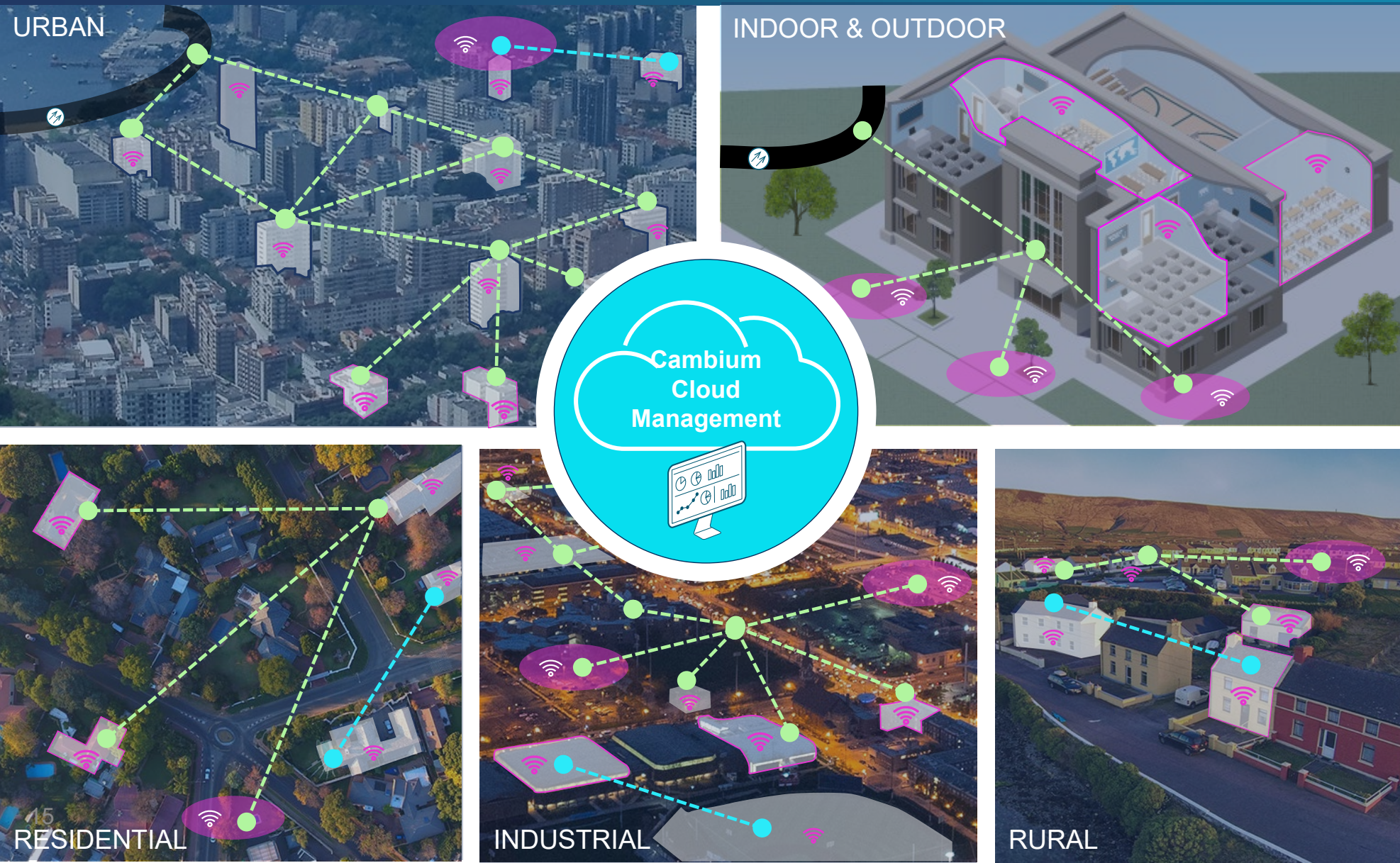
cnWave - Home Pass Breakdown	
POP Installation	\$7,500
DN Installation – Planning/optimization	\$21,500
DN Equipment	\$53,707
Total	\$82,707
No. of subscribes/homes	306
Cost/Home Pass	\$270

cnWave - Home Connection Breakdown	
CN equipment cost	\$79,254
CN installation	\$45,900
Total	\$125,154
No. of subscribes/homes	306
Cost/Home Connection	\$409

FTTH vs cnWave TCO comparison



Cambium Networks Multi-Gigabit Wireless Fabric



Multi-Gig Wireless from Broadband to the Edge

Proven Lowest Cost per Mbps

One Dashboard for Wi-Fi, Switching and Broadband



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