Conquering the Digital Divide

17th Sept. 2020

Siklu

Alex Doorduyn - AVP BD Smart Cities & Security, Siklu
David Sumi – VP of Marketing, Siklu
Dorothy Baunach – Guest Speaker and CEO DigitalC
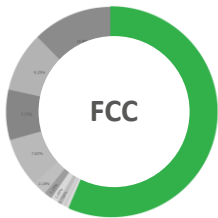
Company snapshot

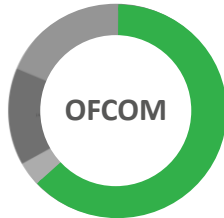## Siklu is a leading player in mmWaves solutions

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Founded: 2008

Employees: 100; Headquarters Israel; Presence in USA, CALA, EMEA and APAC

Technology: groundbreaking all-silicon innovations, mastering the art of mmWaves fixed wireless networks
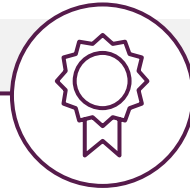
FCC — **Siklu 57%**

OFCOM — **Siklu 63%**

Leading E-Band vendor in the US and the UK
According to FCC & OFCOM

Most Comprehensive

mmWave offering

60GHz V-Band PtP
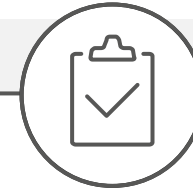
60GHz V-Band PtMP

70-80Ghz E-Band PtP

Network Planning Tool

Most Deployed Links

45 Countries

100k — **Deployed**

100K+ Number of Smart Campus deployments globally

40 — **Patents**

Digital Divide is not just a Rural Community Issue

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DD describes those who cannot access or use common applications due to slow speed connectivity

School:
It is often remote or requires project on line – W/O high speed this is cumbersome or not possible at all

Work:
Working form home is now mainstream, but you need high speed for Zoom, Teams for video conf, file sharing, high def webinars

This puts them into a sub class of citizen

Medical:
Going virtual – doctor visits now commonly on video, accessing medical records

Play:
4K streaming limited only by connectivity

Bridging the DD with Wireless

Key Wireless Network Requirements

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- **Total Solution must be cost effective – meets the SFU business case with low ARPU**

- **Choice of solutions – one product does not fit all needs**

- **Competitive offerings to wireline – 1Gbps, low latency**

- **Rapid Response – bring up customers in days**
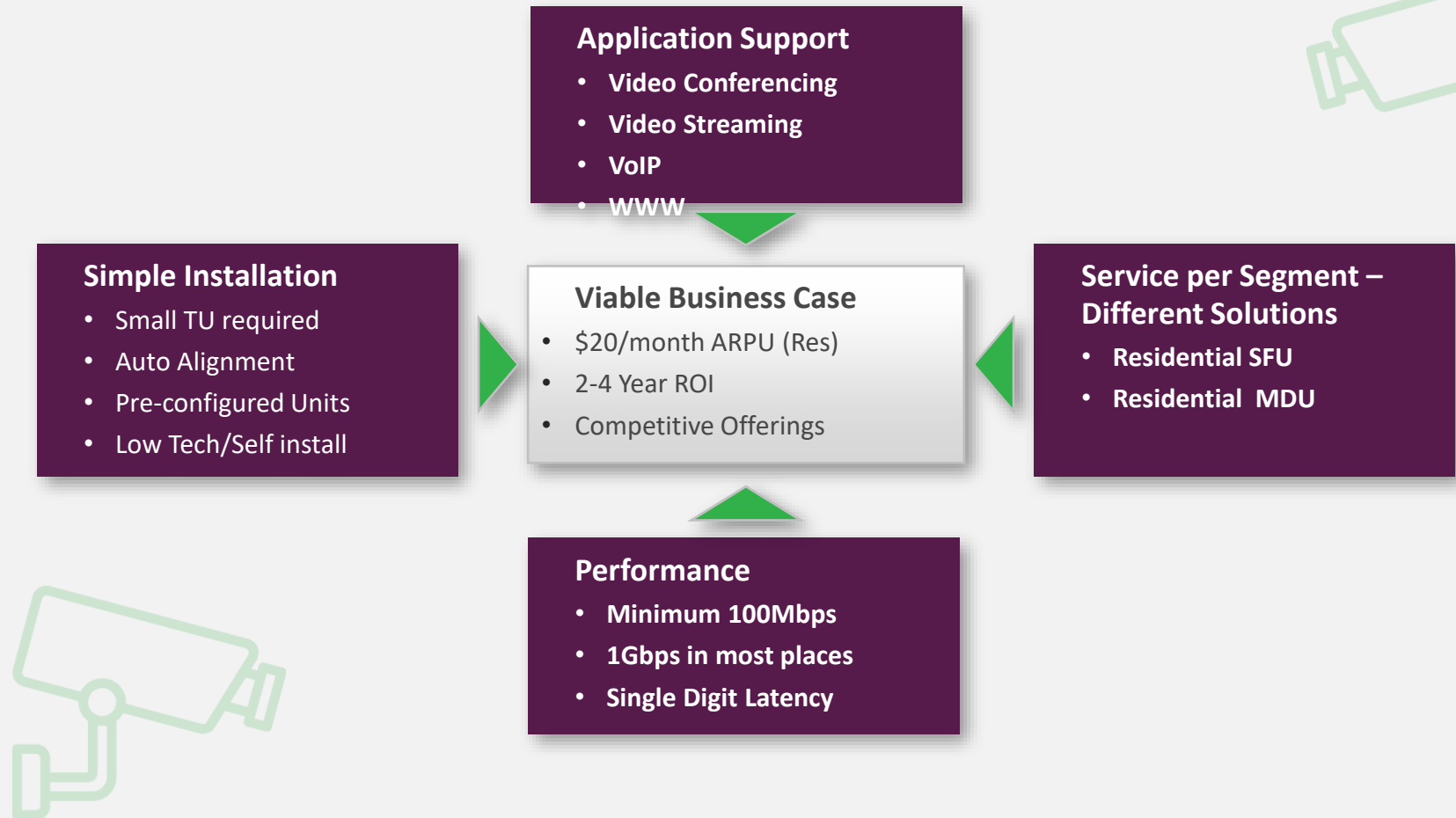
Application Support
- **Video Conferencing**
- **Video Streaming**
- **VoIP**
- **WWW**

Simple Installation
- Small TU required
- Auto Alignment
- Pre-configured Units
- Low Tech/Self install

Viable Business Case
- $20/month ARPU (Res)
- 2-4 Year ROI
- Competitive Offerings

Service per Segment – Different Solutions
- **Residential SFU**
- **Residential MDU**

Performance
- **Minimum 100Mbps**
- **1Gbps in most places**
- **Single Digit Latency**

Digital Divide Connectivity Challenges

Support multiple applications

Future proof capacity

Reliable and Robust solution

That's why we want fiber

Digital Divide Connectivity Challenges

Support multiple applications

Future proof capacity

Reliable and Robust solution

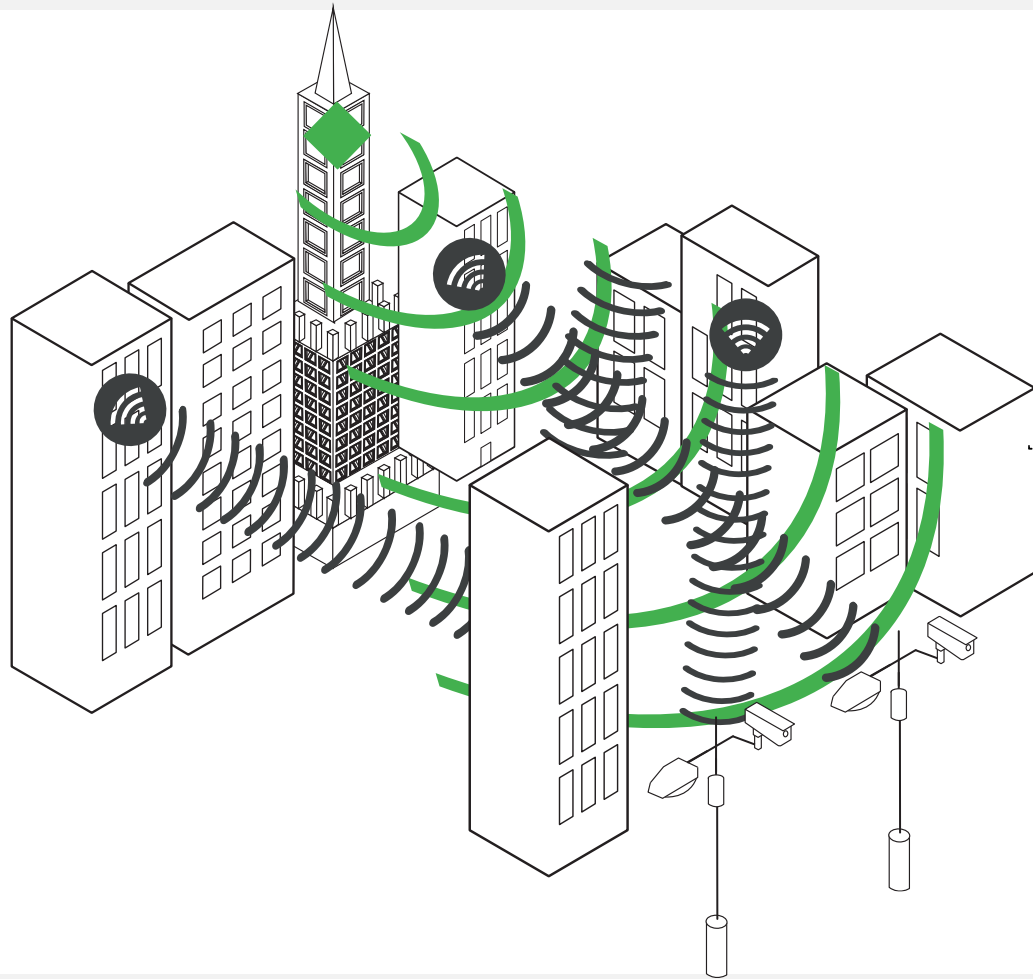**High cost and slow ROI**

Slow to deployment

But...Fiber is expensive to deploy and is time consuming
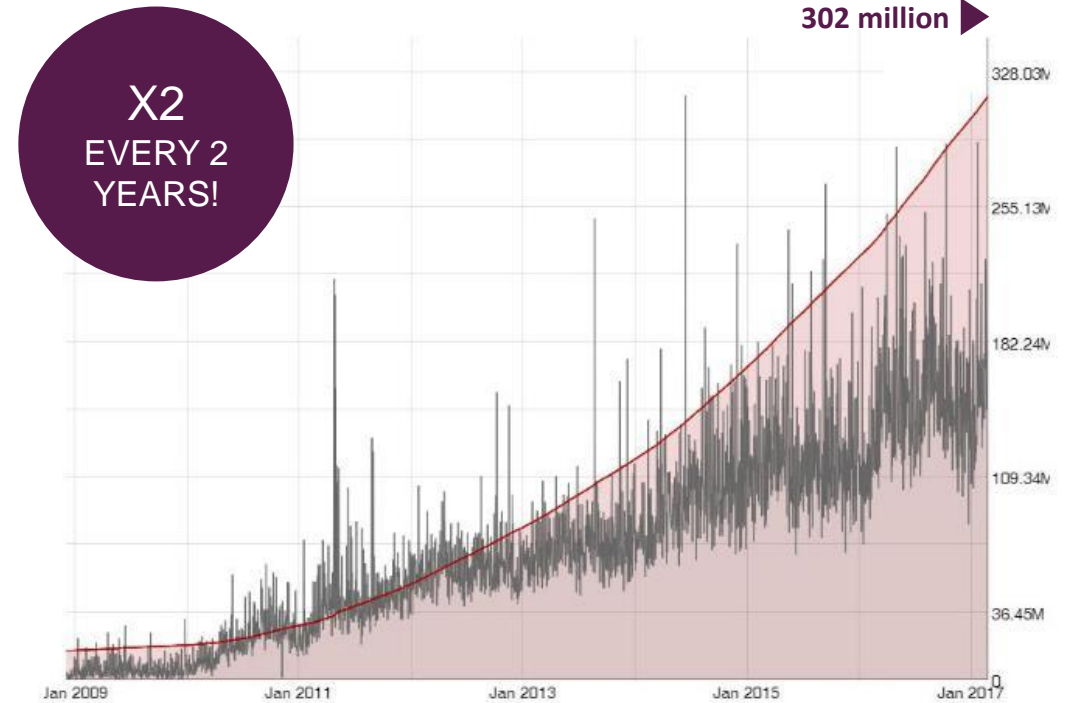
Connectivity Options for Bridging the Digital Divide

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FIBER	LEGACY (5.xGHz) WIRELESS	Mobile 5G	mmWave WIRELESS FIBER*
+ Secure	− Easily hacked	+ Secure	+ Secure
+ Multi gigabit capacity	− Limited capacity	+ Multi gigabit capacity	+ Multi gigabit capacity
− Expensive	+ Low cost	− High cost – monthly fees	+ Affordable
+ Very low latency	− High latency	+ Low latency	+ Very low latency
+ Reliable	− Interference	+ No interference	+ Reliable, Immune to interference
− Slow time to market	+ Fast time to market	− Time to market - carriers	+ Fast Time To Market

*Requires clear line of sight between radios

Legacy Wireless (sub 6GHz) is Congested
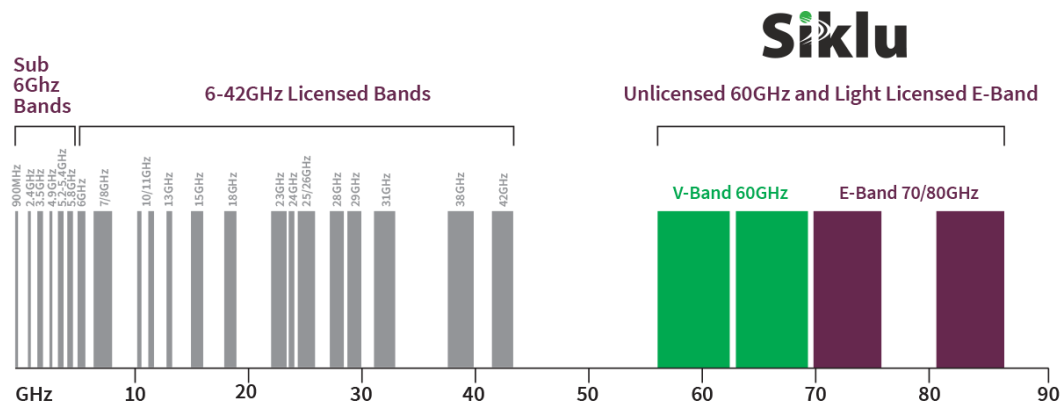
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WiFi **interference** is growing fast

X2 EVERY 2 YEARS!

302 million ▶

328.03M

255.13M

182.24M

109.34M

36.45M

Jan 2009   Jan 2011   Jan 2013   Jan 2015   Jan 2017

* www.wigle.net/stats

What is mmWave Wireless?

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Widest spectrum - High capacity!

Sub 6Ghz Bands

6-42GHz Licensed Bands

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Unlicensed 60GHz and Light Licensed E-Band

900MHz
2.4GHz
3.5GHz
4.9GHz
5.2,5.4GHz
5.8GHz
6GHz
7/8GHz
10/11GHz
13GHz
15GHz
18GHz
23GHz
24GHz
25/26GHz
28GHz
29GHz
31GHz
38GHz
42GHz

V-Band 60GHz   E-Band 70/80GHz

GHz   10   20   30   40   50   60   70   80   90

Narrow beams - No Interference!
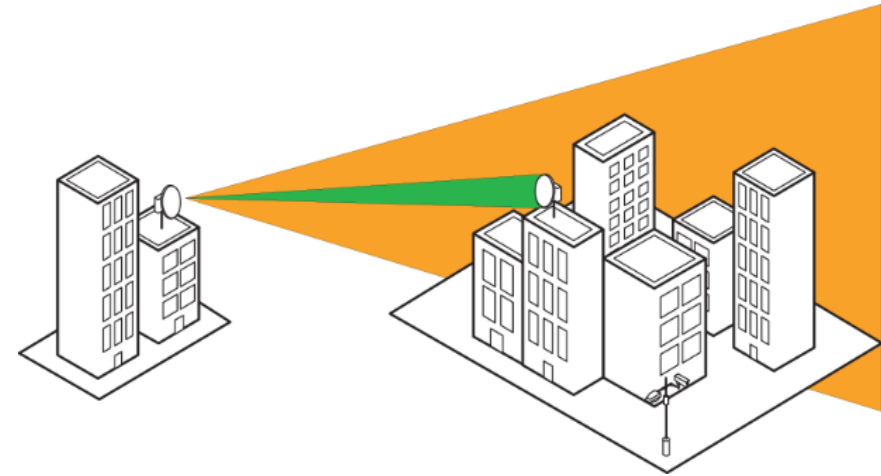
E-Band (70/8 GHz)
Lightly licensed , 10GHz

V-Band (60 GHz)
Unlicensed, 14GHz

Fixed 5G
mmWave Options

The Flavors of 5G

Fixed (GWA) and Mobile (5G NR) Summary

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5G ➡️

High Speed - Gbps
Low Latency -msecs
IoT support

➡️ **mmWave**

Frequencies 28GHz 60,70/80GHz

Applications Mobility, GWA

Licensed or Open
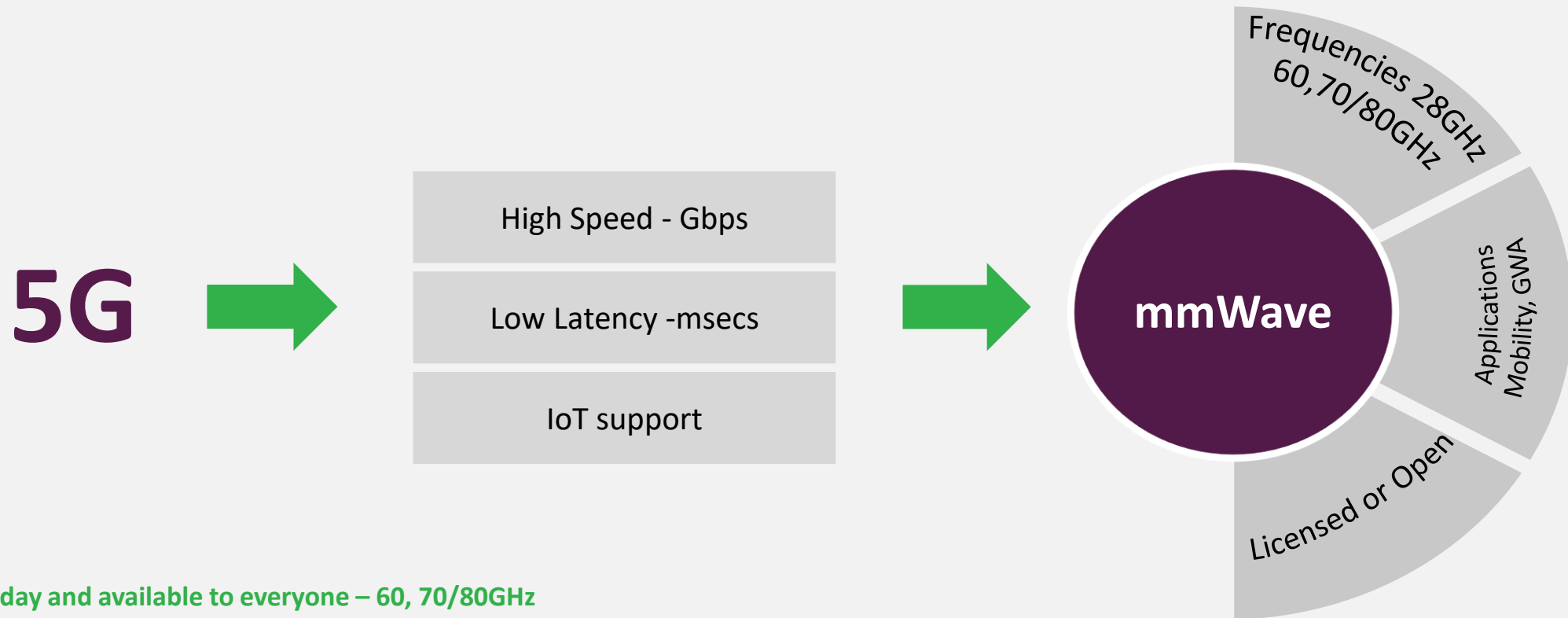
5G is here today and available to everyone – 60, 70/80GHz

GWA - Mobile Operators have no incentive, and $$ dis-incentives to use licensed bands for fixed applications
- -$1.8/GB vs $0.05/GB revenue generation

Smart Cities - have a choice for their 5G networks – fixed or mobile
- Massive price premium for using 5G NR mobile networks in fixed applications

WiFi Today
802.11ay

Standard completed in 2019

Considered an extension/enhancement of 11ad

Fundamental changes in the PHY

PHY changes result in Massive increase in capacity

Channel increased to 8.6 GHz w/ Channel Bonding
256QAM
4x4 MUI MIMO
Up to 40Gbps today, 100GBps future

Range ~1000 feet

Outdoor operation a focus

PMP Topology

Terragraph

Facebook and industry leaders such as Siklu have joined to promote a new standard under the TIP umbrella - Terragraph (TG)

Terragraph is a Layer 2/3 wireless mesh protocol for 60GHz networks

Based on 11ay

Terragraph has two primary applications

Gigabit Wireless Access for homes and business

Smart Cities

TG represents Siklu's *Third Generation multipoint* 60GHz product
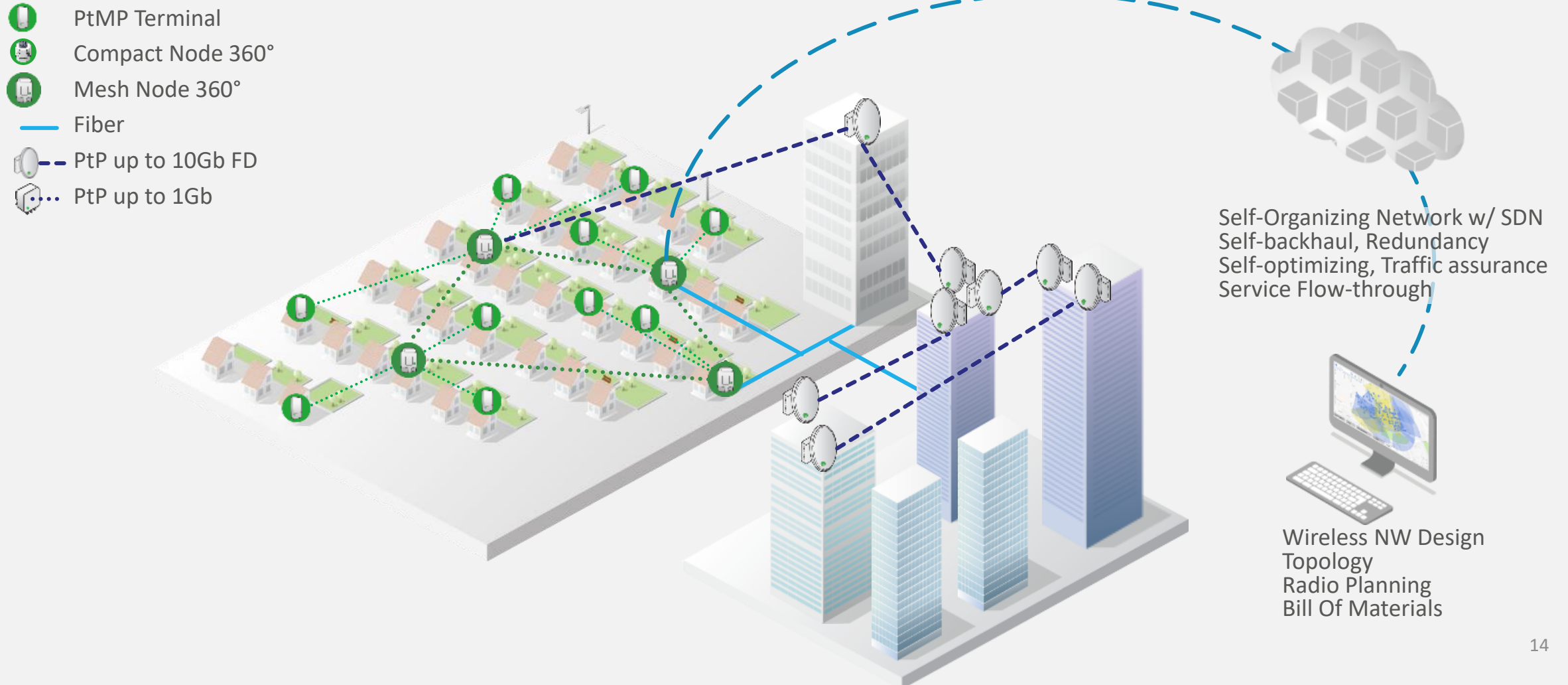
N366 - TG compliant Base Station

cTU - Industry's smallest subscriber unit

TELECOM INFRA PROJECT

Siklu Vision – GWA

End-to-End Gigabit Wireless Access with Siklu PtP/PtMP portfolio

Legend:
- PtMP Terminal
- Compact Node 360°
- Mesh Node 360°
- Fiber
- PtP up to 10Gb FD
- PtP up to 1Gb

Self-Organizing Network w/ SDN
Self-backhaul, Redundancy
Self-optimizing, Traffic assurance
Service Flow-through

Wireless NW Design
Topology
Radio Planning
Bill Of Materials

DD and mmWave

Requirements and how they are addressed

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- **Total Solution must be cost effective – sub $200 Tus in 2021**

- **Choice of solutions – Siklu has PtP, PtMP and Mesh Solutions**

- **Competitive offerings to wireline – mmWave goes from 1Gbps to 10Gbps Full Duplex**

- **Rapid Response – Wireless by its very nature can be installed in a day**

Application Support
- **Video Conferencing**
- **Video Streaming**
- **VoIP**
- **WWW**

Simple Installation
- cTU
- Auto Alignment
- Pre-configured Units
- Low Tech/Self install

Viable Business Case
- $20/month ARPU (Res)
- 2 Year ROI
- Competitive Services

Service per Segment – Different Solutions
- **Residential SFU - low cost TU with Gbps**
- **Residential MDU -10Gbps FD radios**

Performance
- **Minimum 100Mbps**
  - **Up to 10Gbps**
- **Single Digit Latency**
  - **PtP links at 50 microsecs**

Guest Speaker Interview

Dorothy Baunach – CEO
DigitalC

Who is DigitalC?

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 Overview

Vision Statement:

DigitalC is committed to bridging Greater Cleveland's digital divide by providing residents with equitable pathways to the digital future.
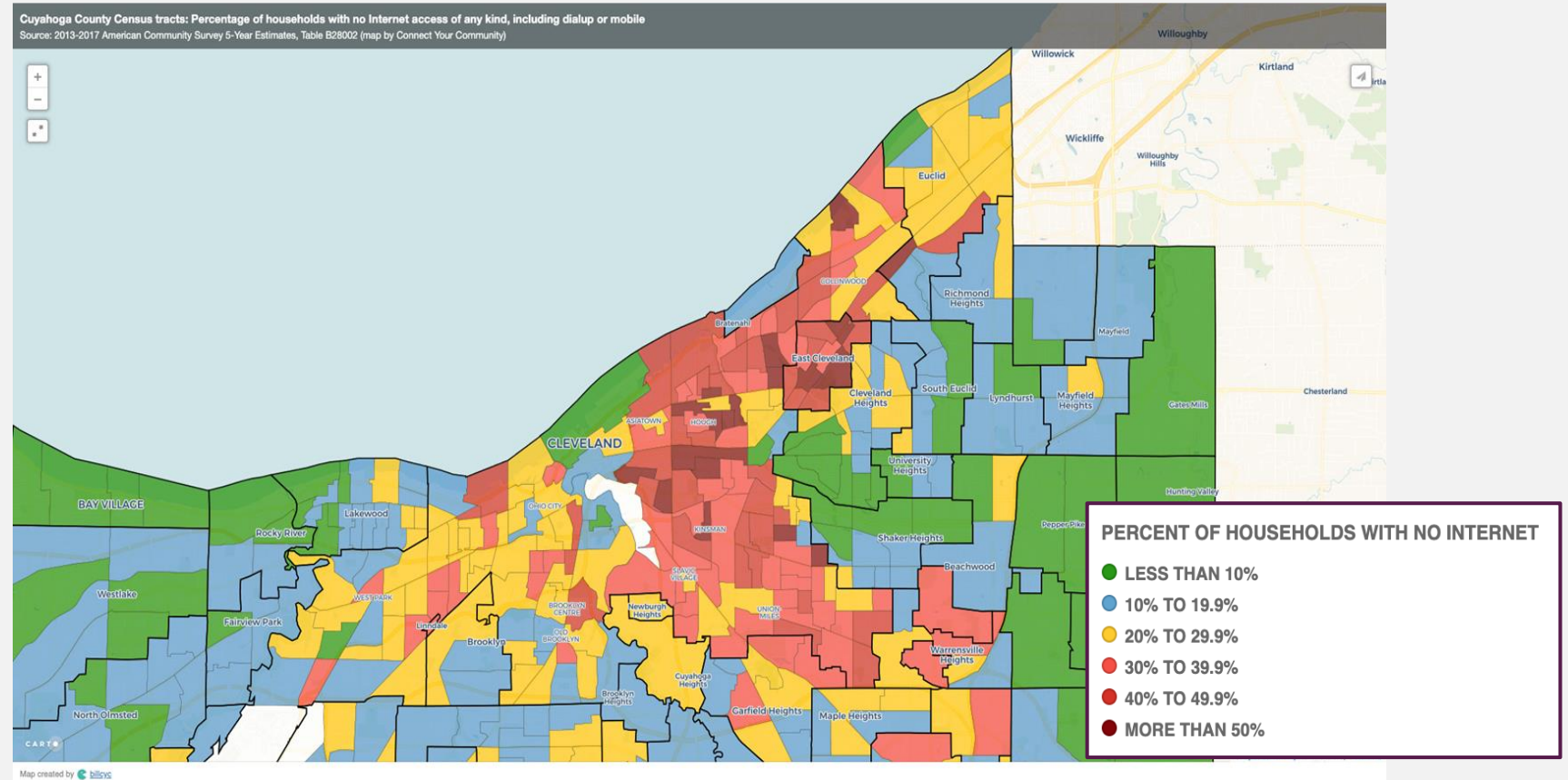
Mission Statement:

We foster digital inclusion for all Cleveland residents through partnerships that create access to 1) affordable high-speed Internet; 2) training and devices; and 3) inclusive shared space for community engagement and innovation.

Broadband in Cleveland

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Top 5 Least Connected City in the US
45K+ Unconnected
75K+ No Fixed Broadband Subscription

Cuyahoga County Census tracts: Percentage of households with no internet access of any kind, including dialup or mobile
Source: 2013-2017 American Community Survey 5-Year Estimates, Table B28002 (map by Connect Your Community)

PERCENT OF HOUSEHOLDS WITH NO INTERNET

- LESS THAN 10%
- 10% TO 19.9%
- 20% TO 29.9%
- 30% TO 39.9%
- 40% TO 49.9%
- MORE THAN 50%

Map created by billcyc

Interview with Dorothy Baunach

CEO DigitalC

Siklu

Q1

Is DigitalC doing this on your own or are you partnering with others?

Interview with Dorothy Baunach

CEO DigitalC

Q2

Do you work closely with the city? Are there government funds available?

Interview with Dorothy Baunach

CEO DigitalC

Q3

Why or how did you determine that mmWave networks were the solution?

Interview with Dorothy Baunach

CEO DigitalC

Q4

What is the status today, and where do you hope to be in one year?

Additional Case Studies

Jade communication

Alamosa Co

Siklu

Challenge

Spring Creek fire wiped out much of the fiber connectivity leaving most of the town without internet access

Results

mmWave PtP and PtMP gigabit solution to deliver Next-Day internet

"Siklu have shown that even in rural and suburban locations their solutions deliver an excellent customer experience and a solid business case for Jade."
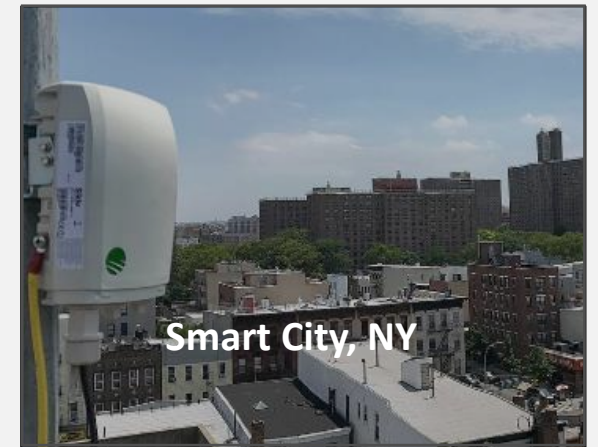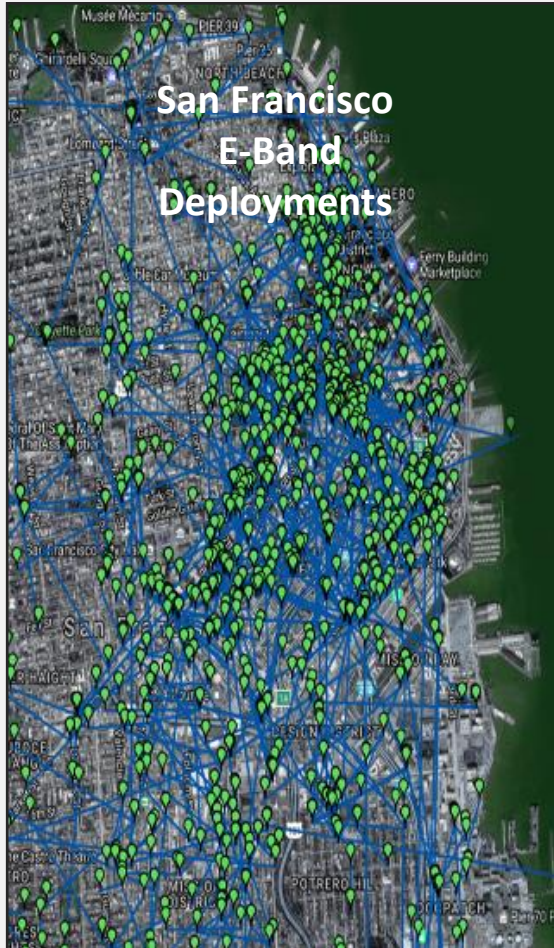
Josh Wehe, Jade

Internet Access

For Everyone, Everywhere

San Francisco E-Band Deployments

GTTH, Sub urban deployment, AZ

GTTH, Urban deployment, SF

Gigabit to the premise Rural communities, MN

PtMP trial Tier 1 Wireline SP

WiFi & SC Backhaul Vail, CO

Smart City, NY

Products & Solutions

mmWave Product Offering

Backhaul & Edge

Roof Top High-Capacity
"Backhaul" 70/80 GHz
Point-to- Point

- Up to 10Gbps full duplex capacity
- ≤ 3 km Range
- Rooftop or pole mounted

Street-level
"Edge" 60 GHz
Point-to- Point

- Dual PoE-Out
- 100Mbps to 1Gbps aggregated
- ≤ 1 km Range

Street-level
"Edge" 60 GHz
Point- to- Multi- Point

- Auto alignment plug & play
- Up to 1.8 Gbps capacity
- ≤ 300m Range (90 deg. angle)
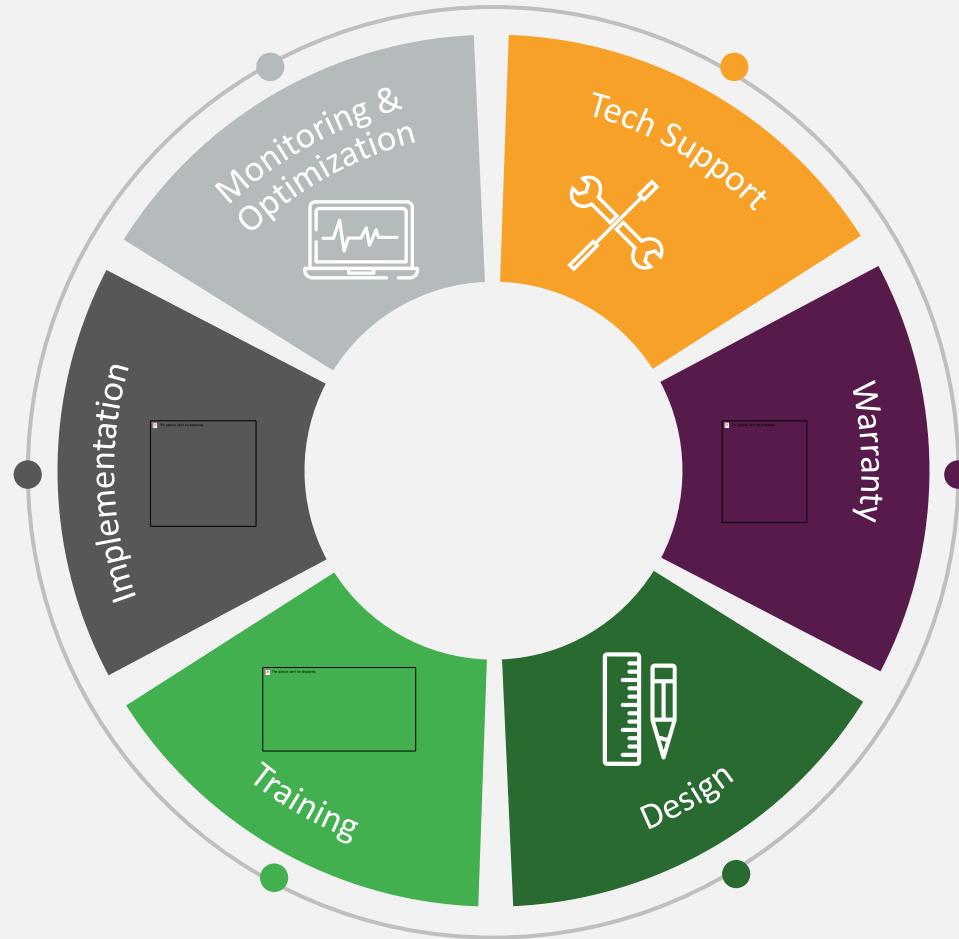- 1 BU: up to 8 TU's

SmartHaul™ Cloud Based Tools
Wireless Network Design Engine (WiNDE), Element Management Systems (EMS)

**Planning and management tools for network designers and managers**

Complete Service Offering

SaaS

Monitoring & Optimization

Tech Support

Warranty

Design

Training

Implementation

Summary

Siklu

01 Fiber performance with Wireless flexibility

02 Quick deployment, rooftops and street level

03 Secured Multi-Gigabit connectivity

04 Supports the Business Case needed to bring gigabits to all

05 Virtually Zero interference

06 Successfully deployed +100,000 units globally

"Siklu – All mmWave, all the time"

V-Band: 60 Ghz

Siklu

E-Band: 70/80 Ghz
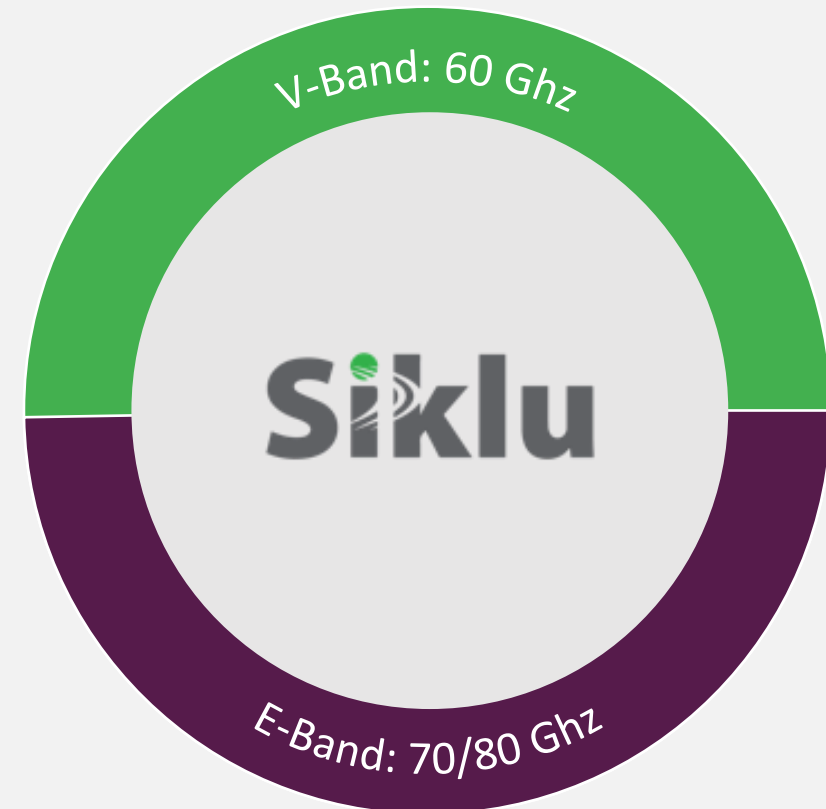
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THANK YOU

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