Low-Cost Fiber Networks

Dennis Burgess

Been in the WISP industry since 2001

- Started a WISP in 2001 using SmartBridge's
- Link Technologies, Inc since 2006
- TowerCoverage.com since inception
- **MikroTik Certified Trainer**
- Author of two "Learn RouterOS" Books
- **Been consulting since 1997**
  - RouterOS / BGP / OSPF / Firewalls, etc.
  - Stop by Link Technologies, Inc. Booth

What are you going to learn

- Take you though hardware and costs for active fiber deployment
  - We won't be including burial or fiber costs, as those are roughly the same

Where you can use this style system.

- **Subdivisions or MDU buildings**
  - Places where you don't have 1/2+ miles between points
- Place your handholes just like you would any other fiber system
  - Instead of cutting the fiber, splicing on ends and plugging into a splitter, you will cut into the jacket, find the number of strands you need for that handhole, wrap everything else back up and leave your 4-10 strands out
  - Each home gets 1 strand
  - Same fiber from the handhole to the home as used in GPON setups
  - WDM optics though

All MikroTik Solution.

- **Hub, end of street,**
  - Where your fiber comes in to the building/subdivision
  - Or you can use your B11 or 80Ghz wireless link
  - 96 strand fiber cable can support 96 clients!
  - All MikroTik Solution
    - 4x CRS326-24S+2Q-RM
    - 10x 40/100 Gig Modules
    - 96x Fiber to Copper Converters
    - 96x hAP ax2 WIFI 6 Home Routers
    - 129x WDM Single-Mode 1gig SFP Modules
  - Gives you 40gig uplink to switch stack and between switches
  - 96 10gig Ports (you will slow them down to 1gig)
  - Easy upgradability to 10gig Optics later, as the switch's already are 10gig.
  - We have a kit that you can order
    - This brings the cost of this down **to $208 per customer**
    - Not including fiber/boxes/installation etc.
    - 10km range

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All MikroTik Solution.

- We have some customers using NetFiber in MDUs
  - Run Fiber vertically, 10gig in/out each netfiber on each floor
  - Still leaves you 7 ports usable on each floor
  - Solution depends on how many units per floor
- Why use active ethernet vs PON in these cases
  - Simplified, nothing with PON to do
  - No cut and splice active PON strands causing outages.
  - Just using switches, industry standard design
  - Gives full port speed to each customer
  - Your uplink is the speed limiter (or your customer)
  - WIFI 6 Routers give them the fastest connection wirelessly
  - We pair this with https://rwb.linktechs.net, giving the customer remote management ability

Low-Cost Fiber Optic

Network Implementation

Without the low-profit pitfall

By Joshaven Potter
System Architect Cambium Fiber

Balancing Your Cost vs Your Value

The main expense in establishing an FTTH network lies in the workforce required for getting from your CO to your customer. Yet, the real value emerges from the services provided. Let's explore how to maximize profit efficiently.

Drawing inspiration from a wise colleague, there are only "3 ways to grow".

1. **Get More Customers**
2. **Sell More to Customers**
3. **Keep Customers Longer**

Although cost control is critical the most critical is maximizing your growth without being wasteful.

Get More Customers

Streamline Provisioning Process

Cut down on installation time with plug-and-play provisioning and upgrades.

With zero-touch, you can connect the equipment to the network and assign a serial number to a subscriber. The rest is automatic.

Principal: maximize your productive time

Get More Customers

Reduced Installer Requirements

Zero-touch installations mean you don't have to find installers who are also qualified technicians. This increases your talent pool options. Making it easier to have the talent you need without having to pay top dollar to scale.

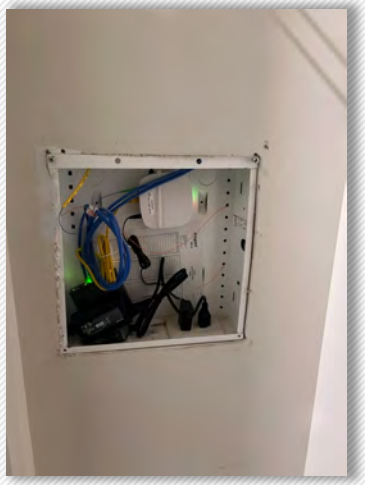
Get More Customers

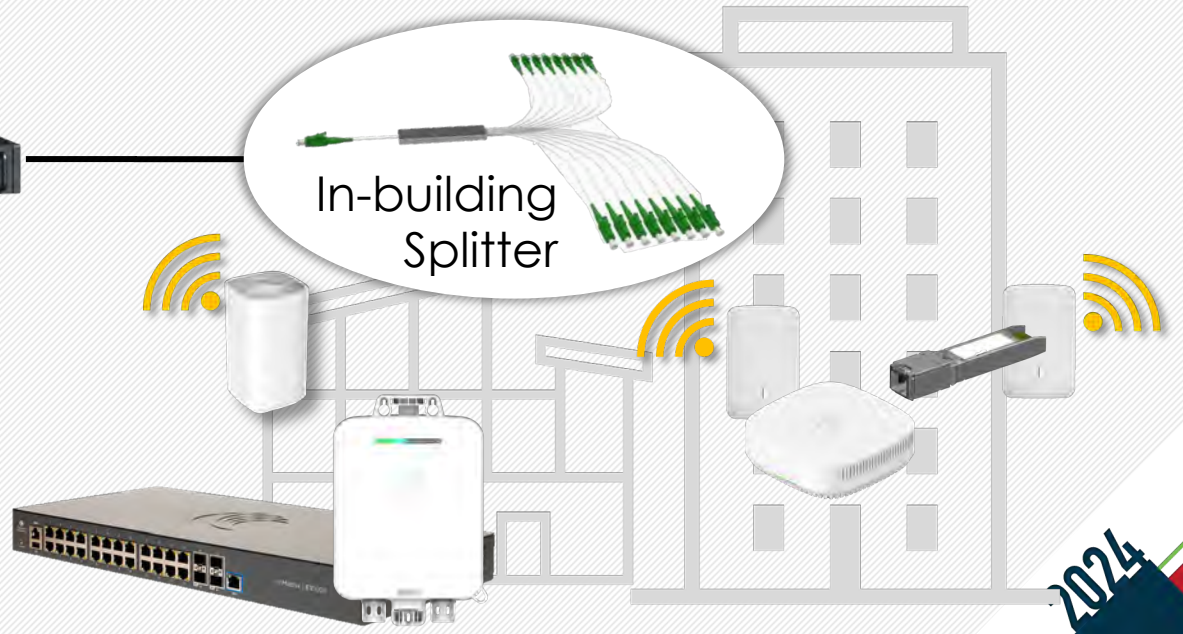
Creativity without Complexity to Go To Market Faster

Leverage our ONE Network where we meld the worlds of Fixed Wireless, Fiber, Home Gateways, and Enterprise Wi-Fi and Switching under one platform.

Get More Customers: The MDU

Leverage a carrier-grade Fiber and wireless system built to excel in a hybrid environment





Multi-Tenant Ready
Enterprise-Class ONTs

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BROADBAND WITHOUT BOUNDARIES

Sell More to Customers - Overview

Extendable Platform that Scales

- Enterprise-grade ONTs for the packet-per-second handling you need
- Feature-rich Home Gateway for managed router solution
- SMB-focused router with unique features

Let's take a quick look at some Cambium offerings that are new to the market

Sell More to Customers – Home Gateway

Advanced Speed Testing

Frequency Coordination

Hybrid Mesh

Plug-N-Play Optimized Wi-Fi

Router-to-Internet Speed Tests

App-to-Internet Speed Tests

Data Sheet

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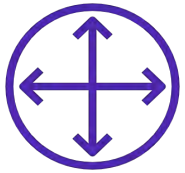
Sell More to Customers – NSE 3000

SD-WAN



- Routing
- WAN Load-Balancing and failover
- Traffic Shaping
- WAN QoS
- Flow Preference
- Failover policy

SECURITY

- Next Gen Firewall (NGFW)
- IDS / IPS
- Site-to-Site VPN
- Client VPN with MFA
- DNS based content filtering
- Application visibility and Control
- Always On LAN vulnerability assessment
- IoT Security

NETWORK SERVICES

- DHCP
- DNS
- RADIUS

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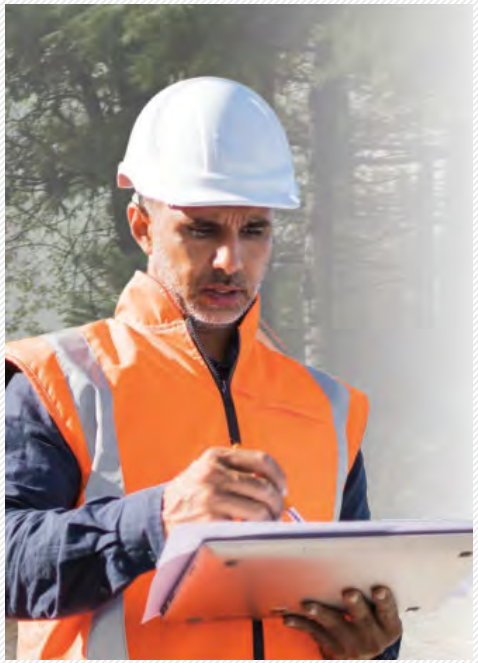
Keep Customers Longer

Carrier Grade Reliability



When your customers expect excellence, you need an excellent platform.

Future Ready Technology

Cambium Fiber Combo PON OLT

- GPON + XGS-PON for low cost and 10G future-ready capability
- 100 Gbps OLT with extensive hardware capability and extended temperature support for reliability

Enterprise Grade OLTs

- Built with high-end instead of budget chips for better packet processing today and for years to come

Special-purpose Outdoor ONTs

- Check out our special OLT built for high and low temperatures to ensure reliability year after year

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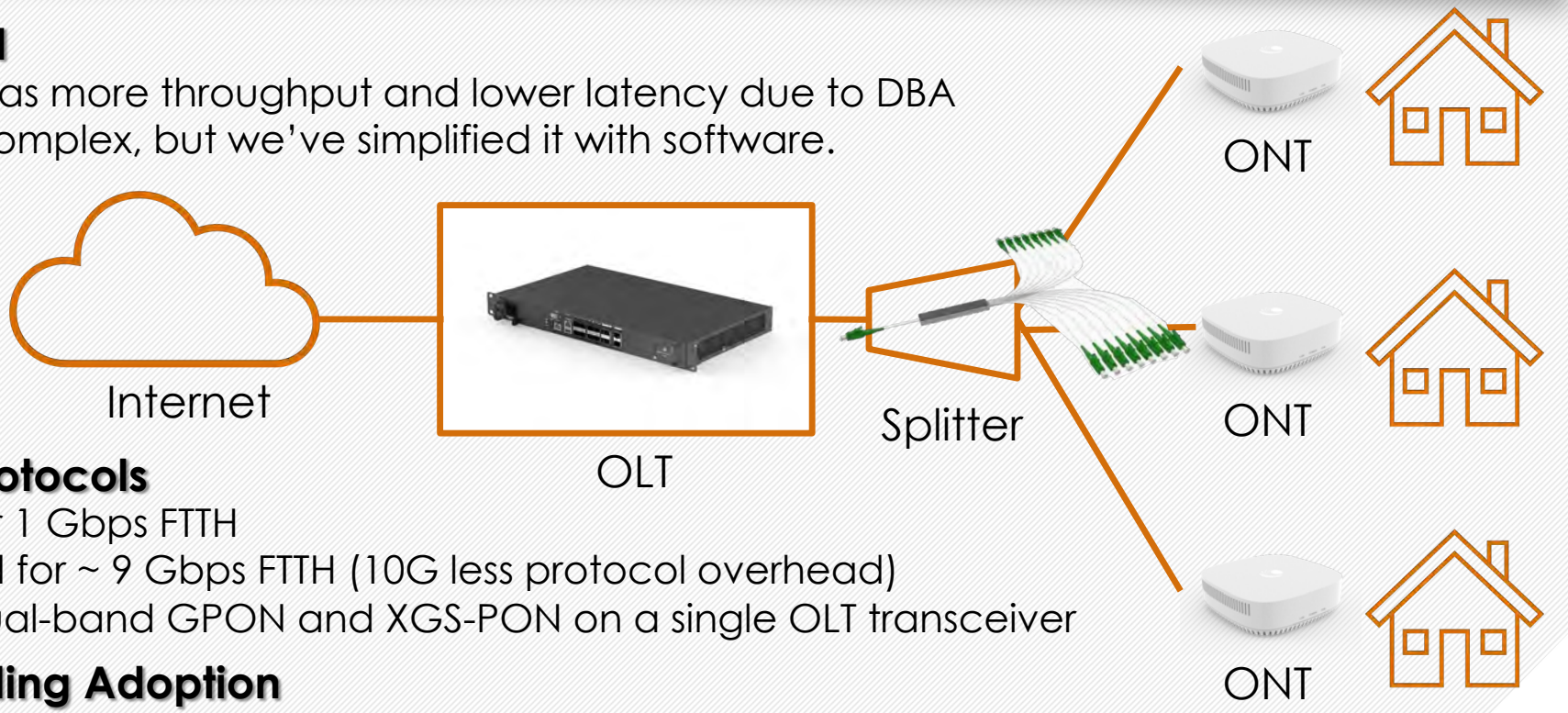
Keep Customers Longer - Protocols…

GPON vs EPON

Winner: GPON has more throughput and lower latency due to DBA
GPON is more complex, but we've simplified it with software.



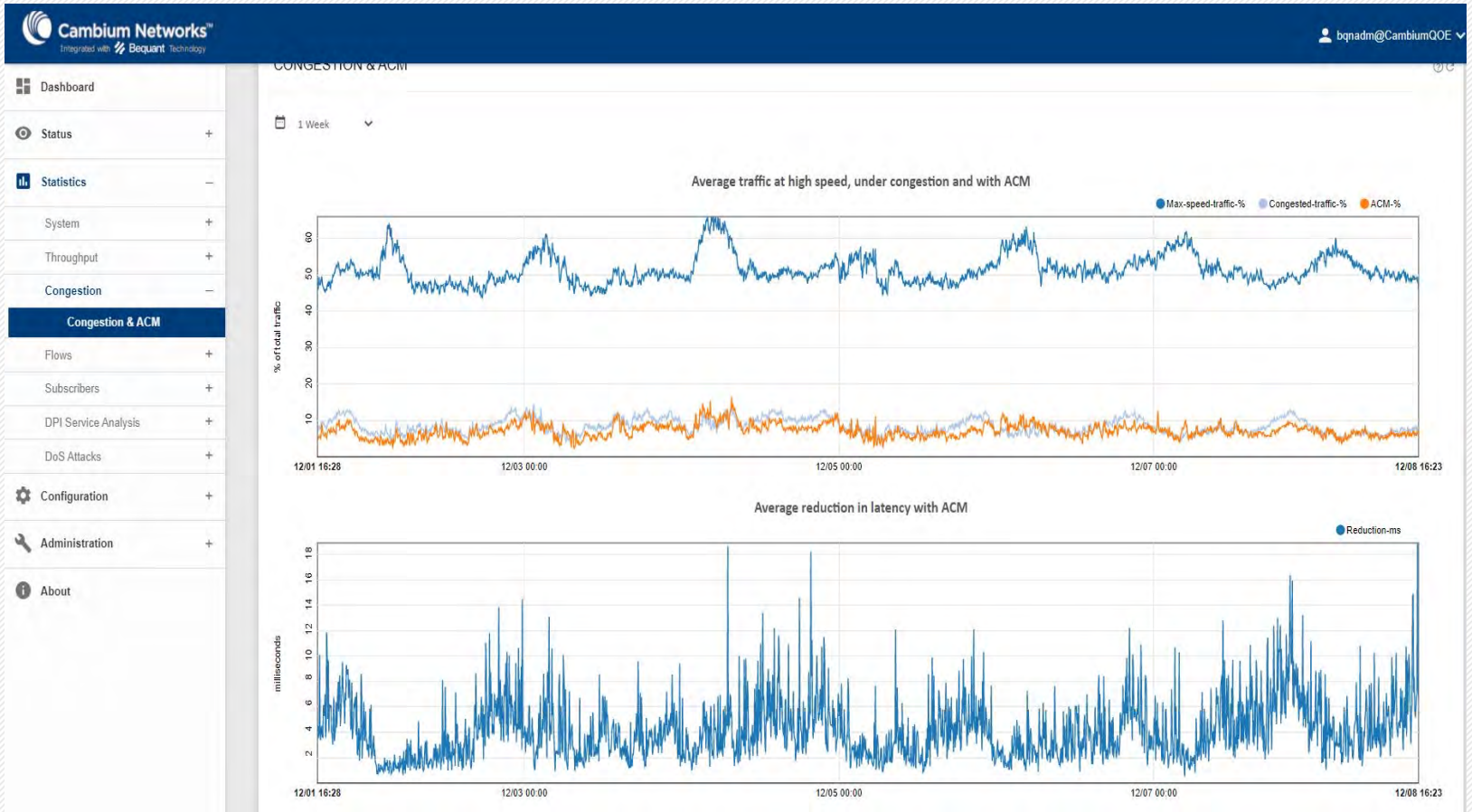
Mainstream Protocols

GPON: Good for 1 Gbps FTTH
XGS-PON: Good for ~ 9 Gbps FTTH (10G less protocol overhead)
Combo PON: Dual-band GPON and XGS-PON on a single OLT transceiver

Protocols Pending Adoption

NG-PON2: Good for ~ 9 Gbps FTTH (4 channels to lower oversell ratio)
25G-PON: Good for ~ 25 Gbps FTTH
50G-PON: Good for ~ 50 Gbps FTTH

Keep Customers Longer - QoE



Reduce latency by solving congestion, not only on your access network, but in your upline, or behind your customer's NAT router. By as much as 16ms. And overall network load by as much as 32%

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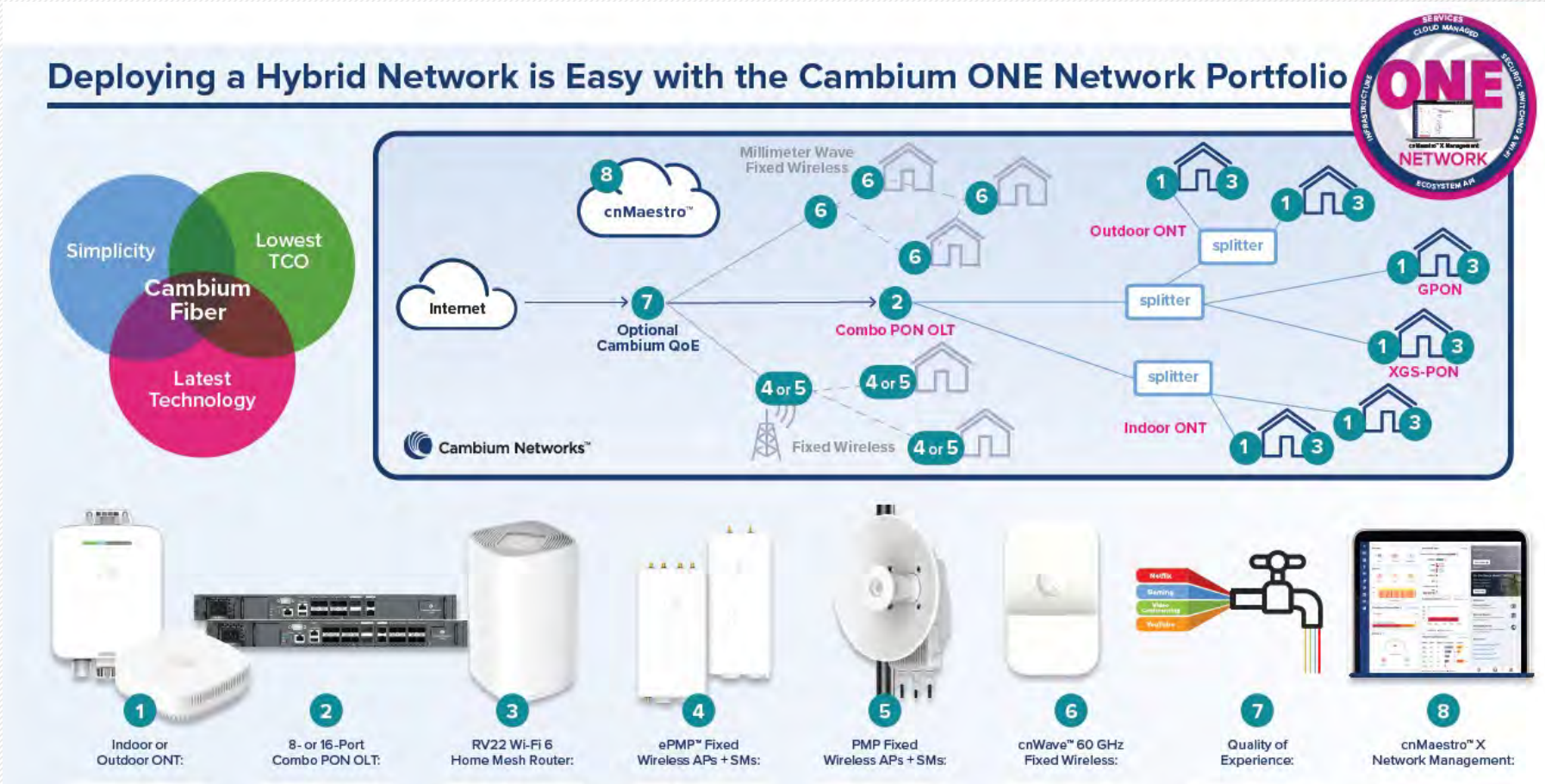
Sell More to Customers – ONE Network



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Jimmy Lewis

Jimmy Lewis, the Managing Partner at Cajun Broadband, is dedicated to providing high-speed internet solutions for underserved communities. Under his and his partner's guidance, Cajun Broadband secured the 603rd spot on the Inc. 5000 list for 2024 of Fastest-Growing Private Companies in America and received nearly $20 million in GUMBO grant funding. This accolade highlights Cajun Broadband's leading role in Louisiana, being the first to complete four significant projects, with plans to finalize the remaining ones within the year. Lewis's dedication to eradicating the digital divide and leveraging his expertise for greater connectivity underscores his impact in the field.

Innovative Financing Models for Fiber Optic Deployment

This topic could explore various financing methods, including public-private partnerships, government grants, and community funding, to reduce the financial burden of fiber optic network implementation.

Cost-Effective Fiber Optic Technologies

An examination of the latest advancements in fiber optic technology that reduce costs, such as micro trenching, blown fiber systems, and the use of alternative materials.

Community-Led Fiber Optic Projects

Case studies or models on how community involvement and ownership can reduce costs and increase the feasibility of fiber optic network projects in rural or underserved areas.

Innovations in Fiber Optic Installation Techniques

Exploring new installation techniques that reduce labor costs and physical barriers, such as directional drilling, aerial fiber installation, and prefabricated fiber optic cable assemblies.

Leveraging Data Analytics for Cost-Effective Fiber Expansion

How data analytics and GIS (Geographic Information Systems) can be used to plan the most effective and economical routes for fiber optic network expansion.

THANK YOU