

Managed Wi-Fi for MDUs Online Summit Ready for Prime Time



Adlane Fellah

Chief Analyst Maravedis
LLC/MDU Experts



Kevin Donnelly

VP Government Affairs,
Technology and
Strategic Initiatives



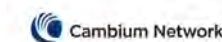
Bryan Rader

President of MDU



Daran Hermans

Director PLM



Shayne Rose

National Director,
Managed WiFi Solutions



Todd Thorpe

Vice President of Sales



Pierre Trudeau

President & CTO



Kaylon Ross

Sr Director,
Ancillary Services



August 29, 2023 – 11am EDT USA

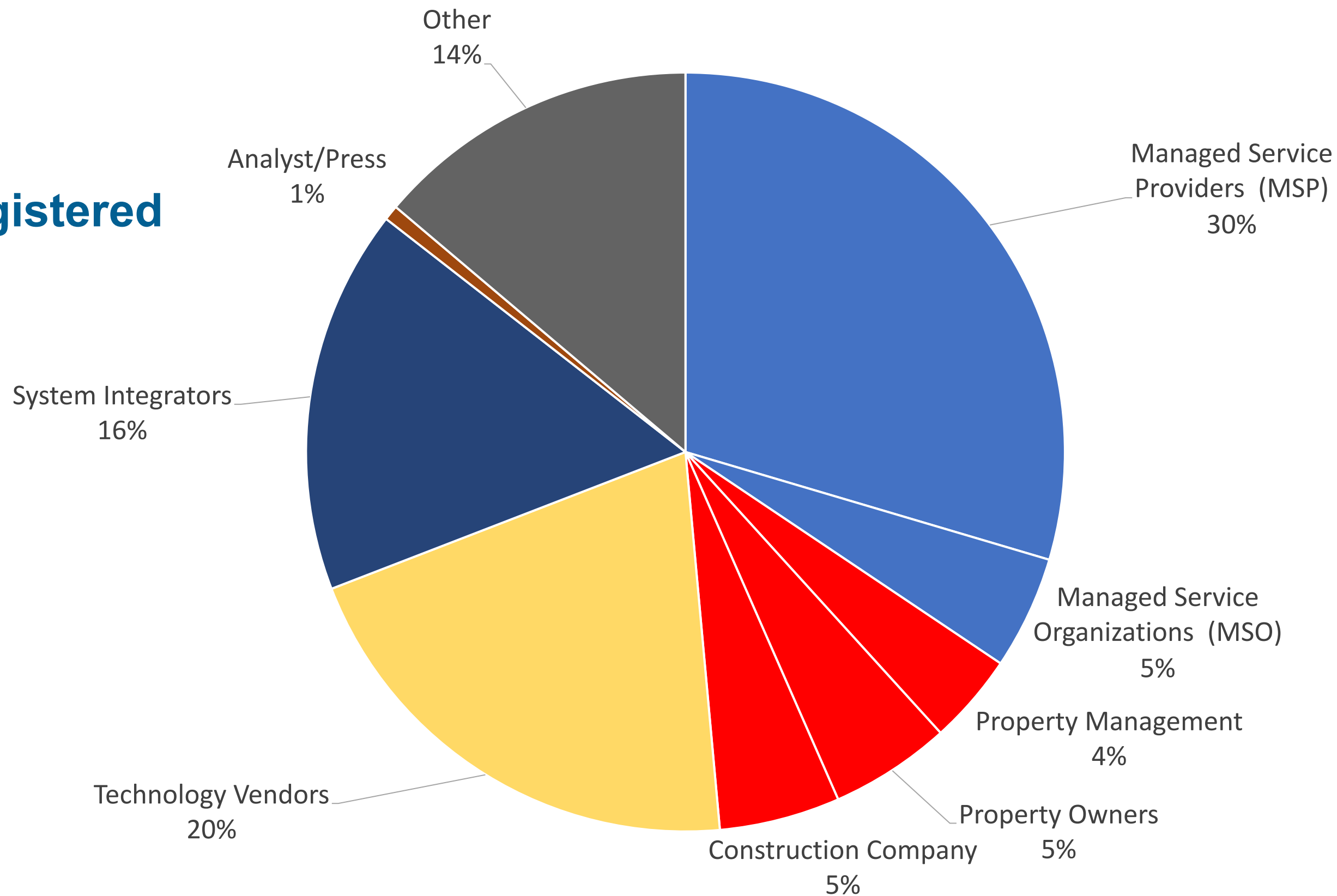
Format	Organization	Speaker	Title	Topic (s)	Time (mins)
Presentation	Maravedis/MDU Experts	Adlane Fellah	Chief Analyst	Welcome and drivers for Managed WiFi for MDUs	15
Presentation	NMHC	Kevin Donnelly	Vice President, Government Affairs, Technology and Strategic Initiatives	Current technology and connectivity initiatives by the NMHC	10
Presentation	Pavlov Media	Bryan Rader	President of MDU	How We Got Here and Why Managed WiFi is so Important	10
Presentation	Cambium Networks	Daran Hermans	Director, PLM	Mixing in new 6 GHz Wi-Fi with existing 5 GHz Wi-Fi Personal Wi-Fi increases tenant satisfaction, is unique and can be monetized. Roaming Wi-Fi offers a secure and unique experience	15
Presentation	Cloud 5 Communications	Shayne Rose	National Director, Managed WiFi Solutions	Managed WiFi – What matters most to owners and to residents	10
Presentation	Positron Access Solutions	Pierre Trudeau	President & CTO	Leveraging legacy wiring in Brownfield MDUs to enable Managed Wi-Fi	10
Presentation	Dojo Networks	Todd Thorpe	Vice President of Sales	The ingredients of successful owner and provider partnerships that achieve winning deployments	10
Panel	All participants	All participants	Panel	Panel with special guest Kaylon Ross Sr Director, Ancillary Services at AvalonBay Communities, Inc.	25
Q&A	Q&A	Audience			15
Total					120

House Keeping Items

- This event is being recorded
- You will receive the slide deck in the next 24 hrs
- Tell us how we did and what we missed in the survey

Distribution of Registrations by Segment

355 Registered



Consulting & Advisory

- What is the business case for Managed Wi-Fi?
- Solution requirements development
- Vendor evaluation
- What is the right support strategy?
- The trade-offs of managed Wi-Fi vs self-maintaining
- What are the technology choices?
- Key factors to look for when reviewing proposals for managed Wi-Fi?
- How to reduce the cost of upgrading structured cabling in Brownfield developments?
- Training



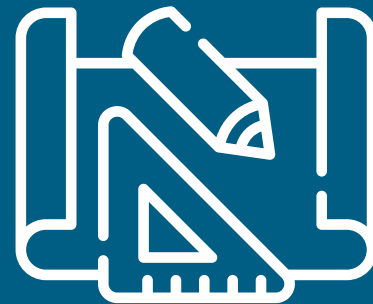
Research

- MDU service providers ranked by properties served in US
- Online Surveys
- One-on-one interviews
- Custom research



Tools

- Wi-Fi Deployment Guidelines
- List & contacts of top 50/100/250 MSPs
- List & contacts of system integrators
- List of top 200 building developers
- List of mid-tier property owners
- Mapping building connectivity



Lead Generation

- Lead generation activities: Webinars, online events
- Market opportunities identification
- Industry contacts and introductions
- Partnership development
- Custom requirements





WBA Annual Industry Report 2023
Industry Report
Wireless Broadband Alliance



Unlocking B2B2x Monetization
White Paper
Optiva



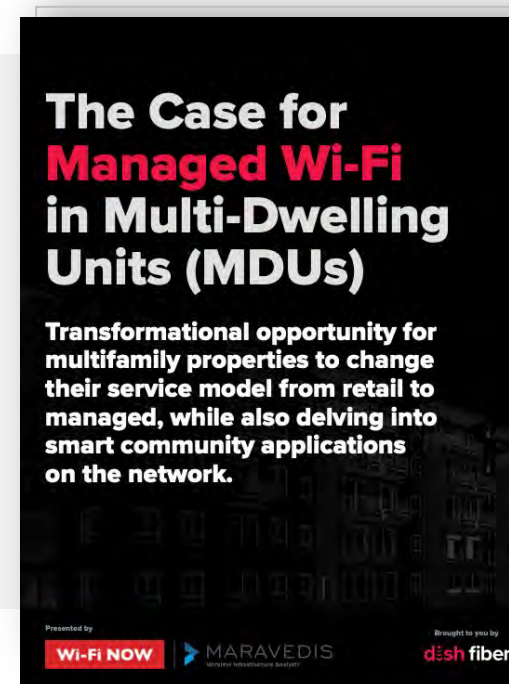
LoRaWAN is transforming water Network Operations
White Paper
LoRa Alliance



TIP Open WiFi—Unlocking WiFi Potential
White Paper



5G Smart Sea port
White Paper
Nokia



The Case for Managed Home in MDUs
White Paper
Dish Networks

Bulk Internet

Bulk internet is a service that provides a community with internet. This means that a bulk internet contract covers every unit using a single provider

Managed WiFi

Managed WiFi involves designing, installing, and **professionally** managing the wireless network **throughout** the property, independent of who owns the equipment

Benefits of Managed Wi-Fi

Residents



Property Owners

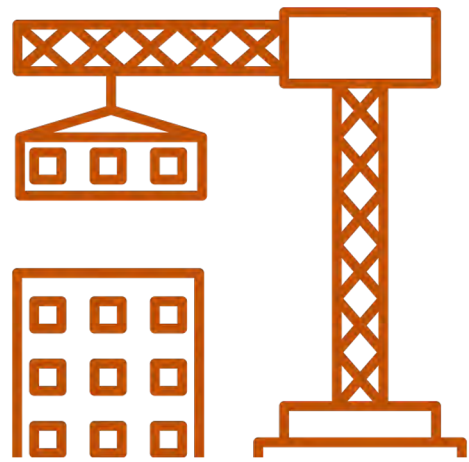


CSPs



Market Drivers

New Constructions



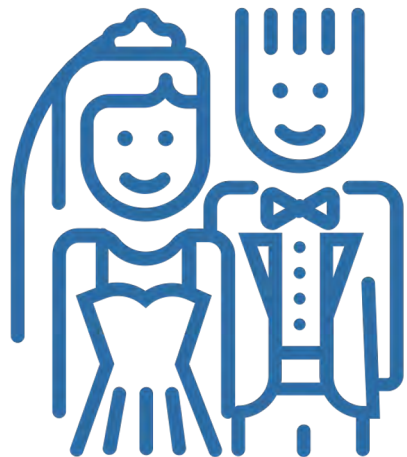
More Devices



Institutional Investors



New Generations



New Expectations

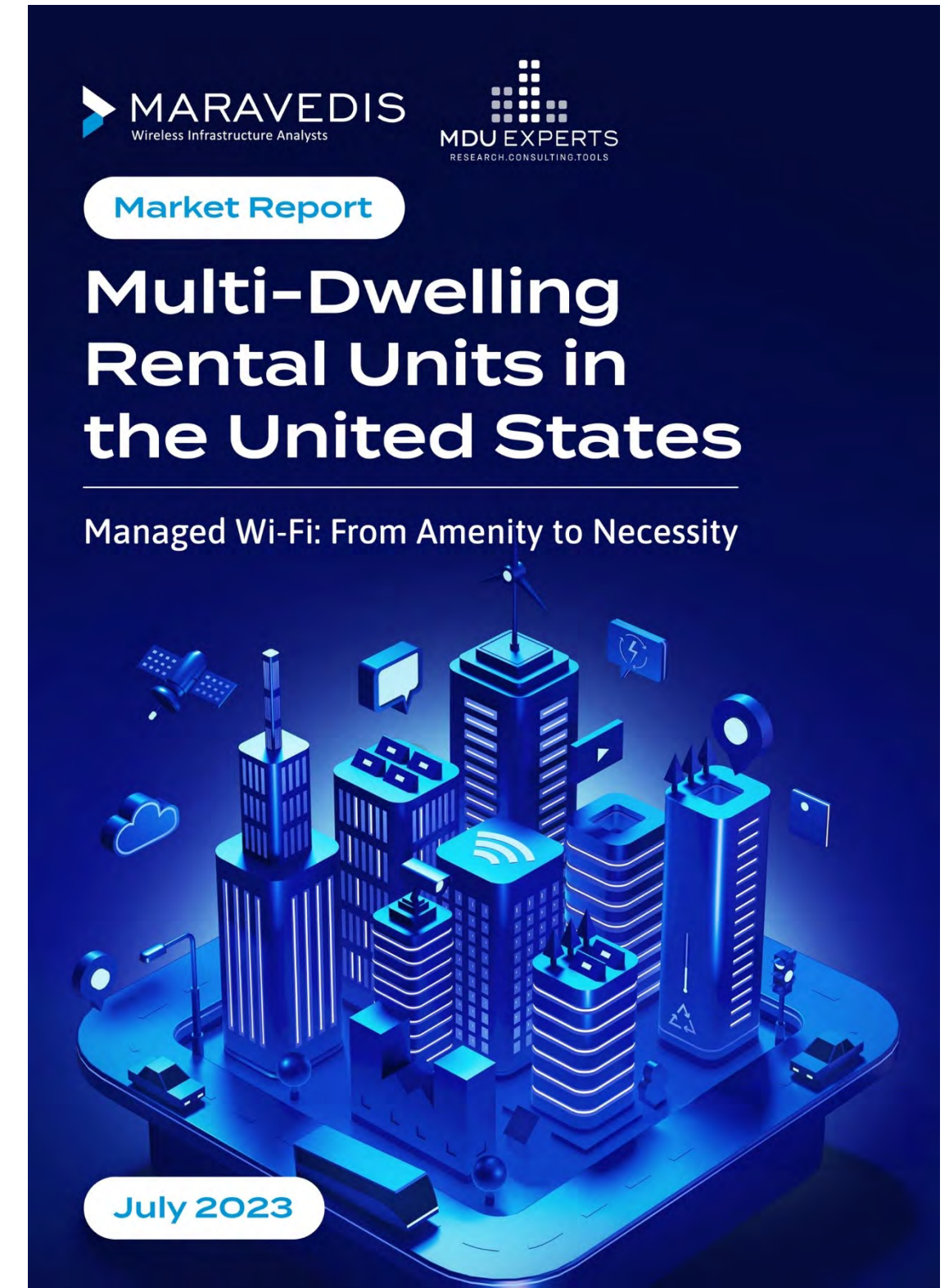


NaaS



Independent, Unbiased Market Report

1. Online Survey
2. One-on-One Interviews
3. Market Projections

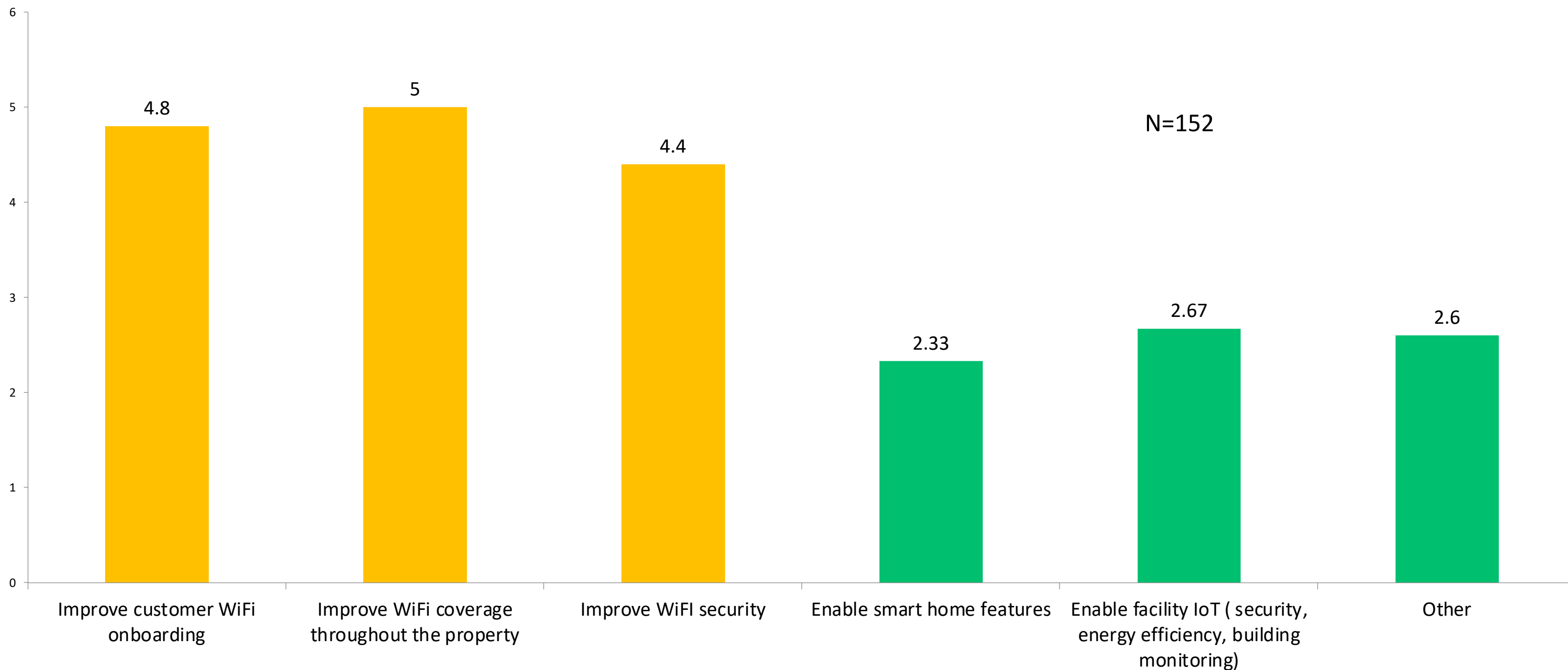


Online Survey

What part of the ecosystem do you belong to?

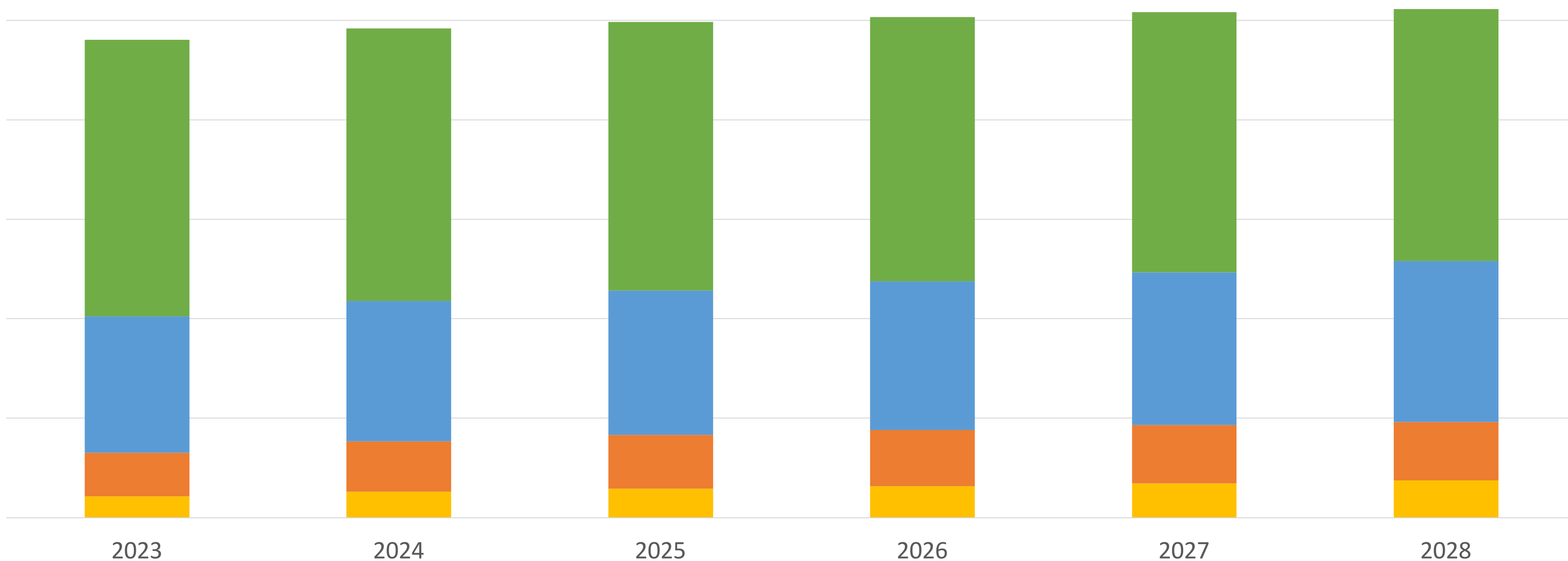


If you are looking to add a Managed Wi-Fi offer in the coming months (or have already one), what are the most compelling drivers for you? Please rank from most important (1)

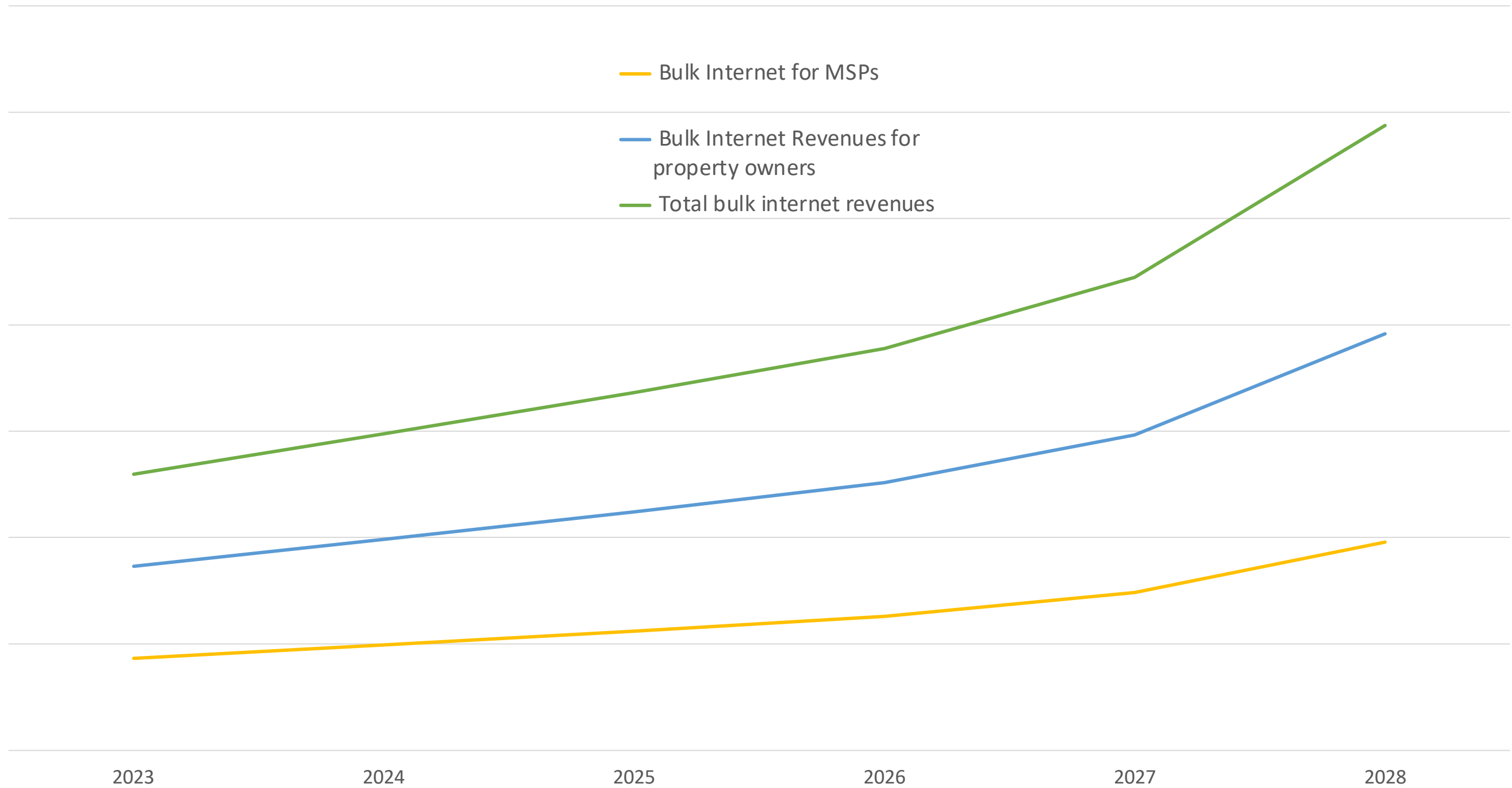


Rental Unit Stock by Age and Density TAM

- Rental Units in Properties with More than 100 units that are less than 5 years old
- Rental Units in Properties with less than 100 units that are less than 5 years old
- Rental units in Properties with more than 100 units that are more than 5 years old
- Rental units in Properties with less than 100 units that are more than 5 years old



Bulk Internet Revenue Projections





ADLANE FELLAH
CHIEF ANALYST

Mr. Fellah is a veteran industry analyst and investor with 25 years of experience in the telecom sector. He authored various landmark reports on Wi-Fi, 5G, and technology trends in various industries including residential, enterprise, and industry 4.0.



TOM GRUBA
CHIEF CONSULTANT

Tom Gruba has 30+ years of experience in telecommunications serving various capacities including engineering, product management, sales, marketing and innovation with broad expertise in wireline and wireless systems.



FRANK RAYAL
SENIOR CONSULTANT

Frank helped build the very first mobile networks in North and South America and Europe. He later worked to develop telecom infrastructure products at leading vendors, including first-of-kind systems at startups he helped co-found.



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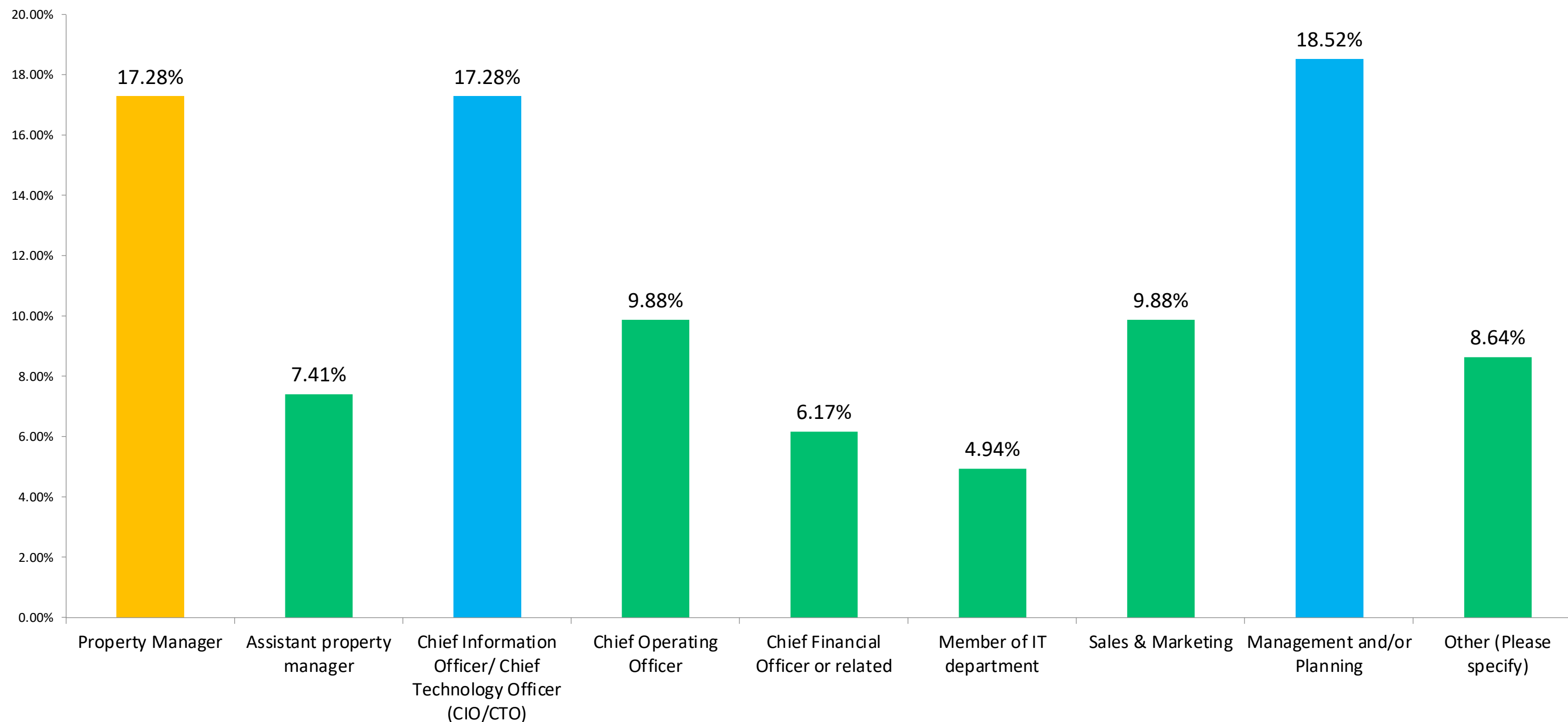
Thank You!

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Reference Slides

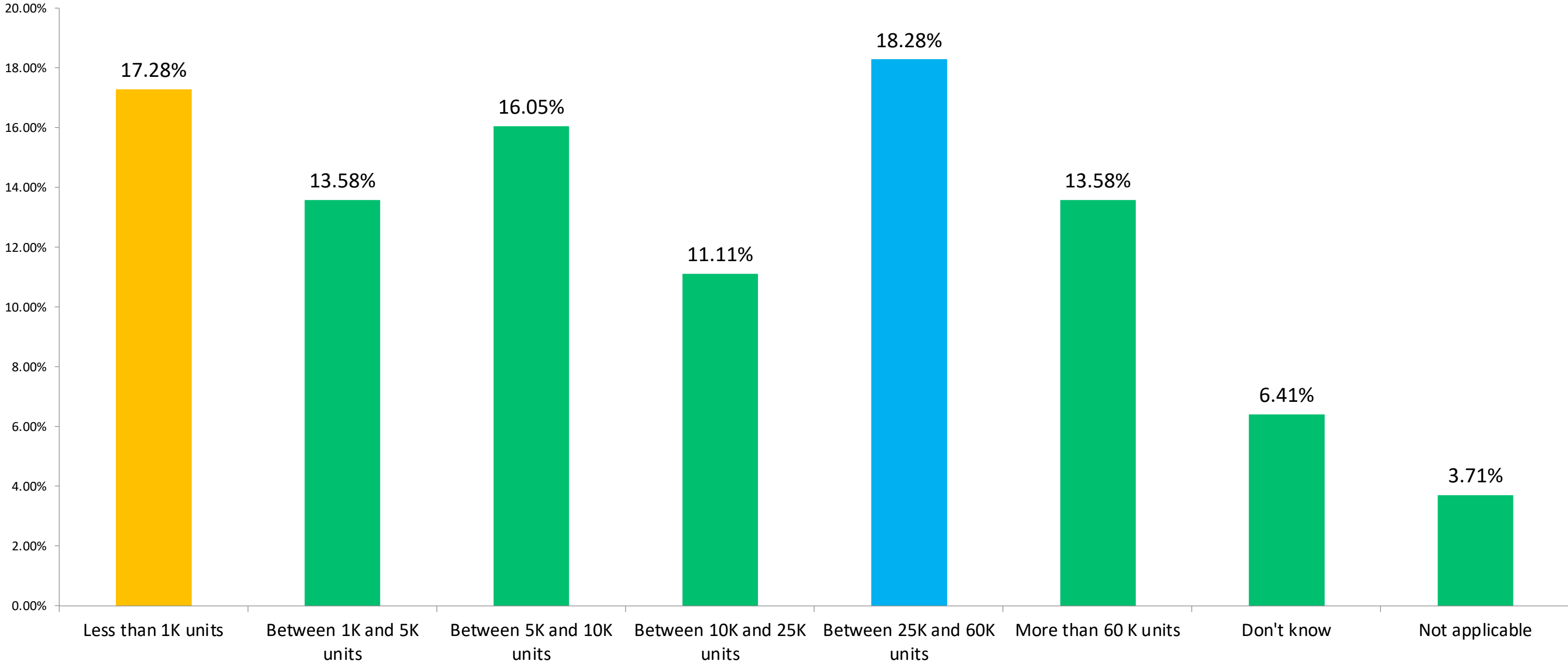
Online Survey

What is your area of work?



Online Survey

How many units do you currently manage/operate? only answer if you are a property manager/owner



Consulting Services:



- Developing the business case for Managed Wi-Fi
- Identifying the business model & metrics
- Determining support levels - for residents and property owners
- Determining security implications of Managed Wi-Fi
- Alternatives and costs for providing broadband
- Clarifying the role of vendors, SIs, and MSPs
- Identifying key factors when reviewing proposals for managed Wi-Fi
- Understanding the risk-reward for managed Wi-Fi vs Self Maintaining
- MDU service providers ranked by properties served in US

Conventional Units



Senior Living



Student Housing



Affordable Housing





Save you hundreds of hours in research time



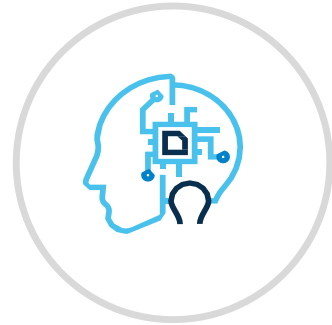
High exposure of your content thanks to our credibility



Save you thousands of dollars in ad budget from leveraging our media relationships



High return on your marketing dollars



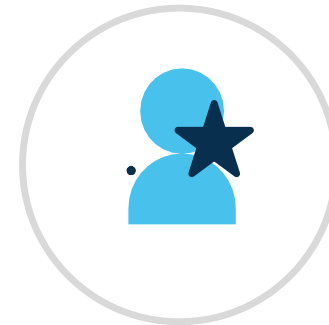
**Strong Technical
Expertise in Wireless and
ICT**



**Valuable Media
Partnerships in
Place**



**Deep Knowledge of
the Industry**



**Highly Creative
& Flexible
Team**



**High Credibility
in the Market**



**Great Value for
your Marketing
Dollars**



NATIONAL
MULTIFAMILY
HOUSING
COUNCIL

APARTMENT LEADERSHIP RESIDES HERE™

**Managed WiFi and the Importance for
Multifamily Property Developers, Owners
and Managers**

*Kevin Donnelly VP, Government
Affairs, Technology and Strategic
Initiatives ,NMHC*

Maravedis Managed WiFi Online
Summit, August 29, 2023

NMHC/ GRACE HILL RENTER PREFERENCES SURVEY



221,559 Resident Responses

4,564 Properties

12 of the Largest Apartment Companies

44 States

70 Cities

nmhc.org/residents

WHAT DO RENTERS SAY?

We love high-speed internet



89%

WHAT DO RENTERS SAY?

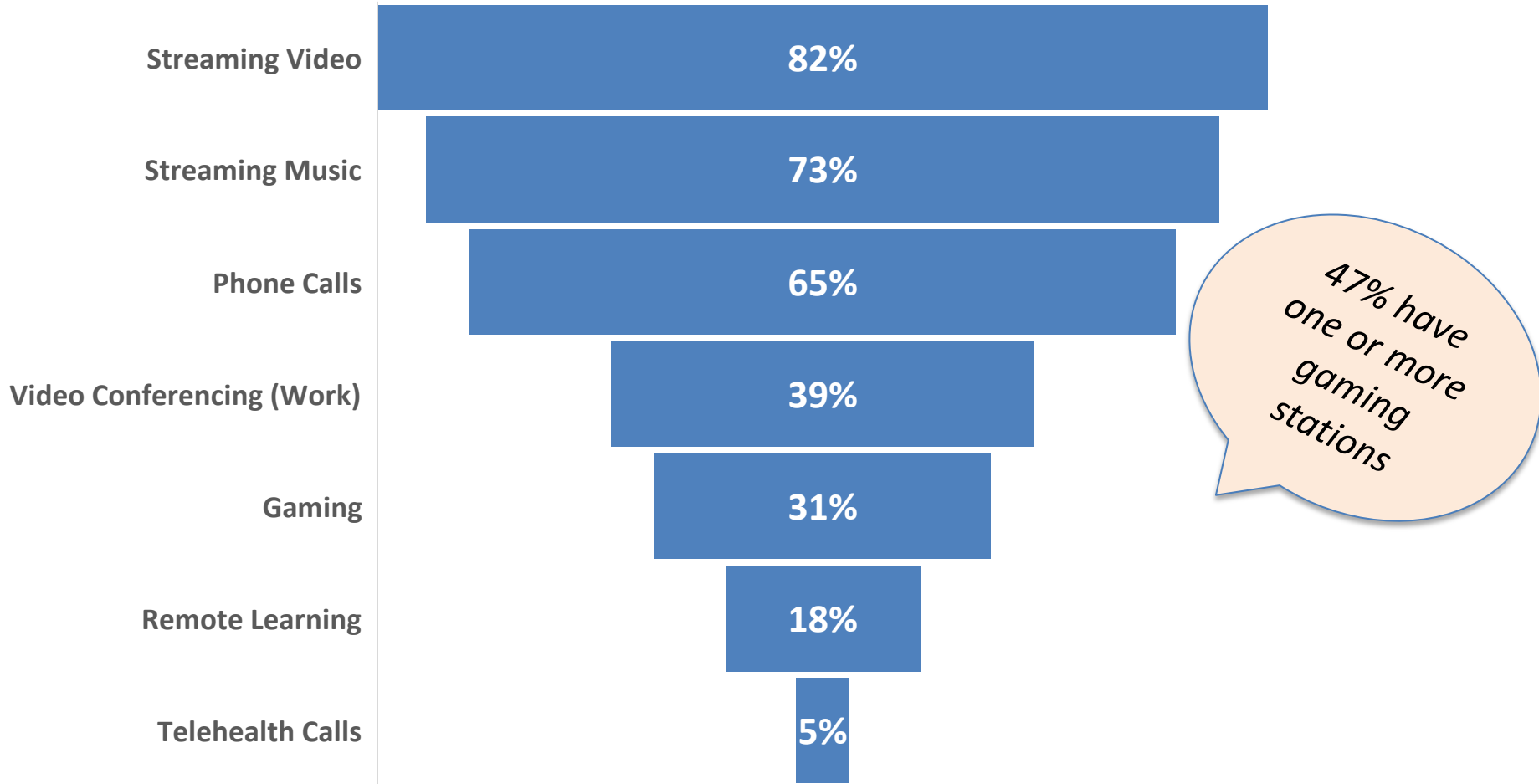


We won't rent without high-speed internet

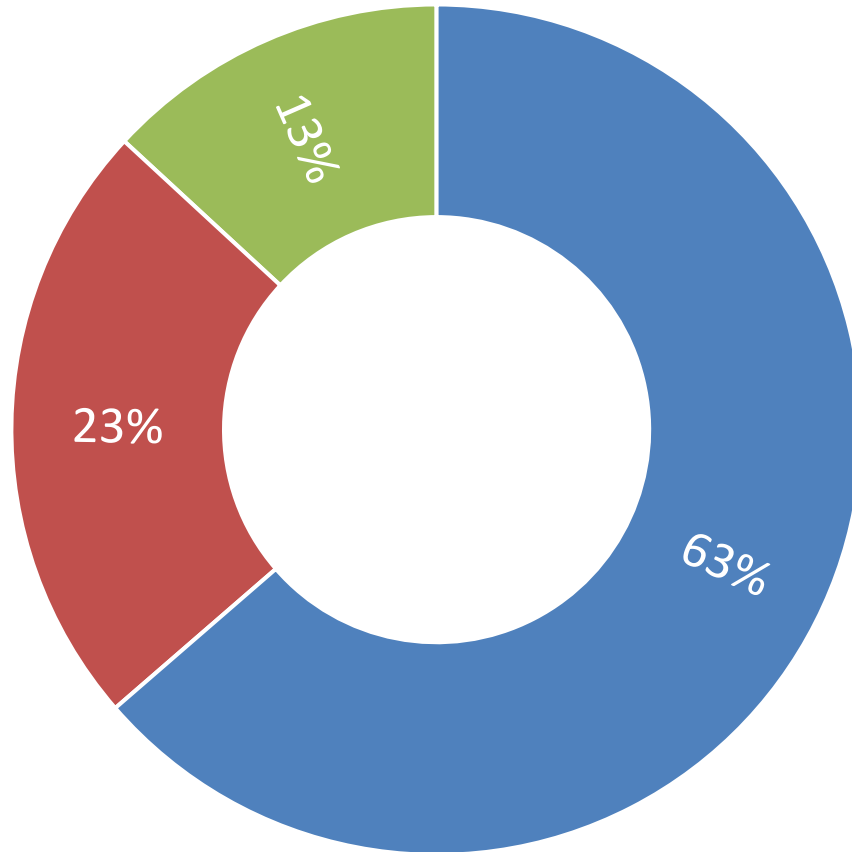
54%

WHAT DO RENTERS SAY?

(DO DAILY ON THE INTERNET)



WHAT DO THE RENTERS SAY? (SATISFACTION WITH INTERNET QUALITY)



86% are either satisfied or neutral

- Satisfied
- Neutral
- Dissatisfied

WHAT DO THE RENTERS SAY?

(DISSATISFACTION WITH INTERNET QUALITY)

Of the 13% dissatisfied and could select more than one

- | | | |
|----------|---|------------|
| 1 | Doesn't Fully Support My Needs | 65% |
| 2 | Too Many Service Outages | 38% |
| 3 | Wanted A Different Internet Provider | 23% |

WHAT DO THE RENTERS SAY?

(TOP 3 FACTORS WHEN EVALUATING SERVICE)

Could select 3.
Provider
reputation was
chosen by 5%.

1 Speed of Service

74%

2 Cost of Service

64%

3 Reliability of Service

64%

WHAT DO THE RENTERS SAY?

How important is it to have your internet service available immediately on move-in?

83%

Very Important or
Absolutely Essential

48%

Absolutely Essential

WHAT DO THE RENTERS SAY?

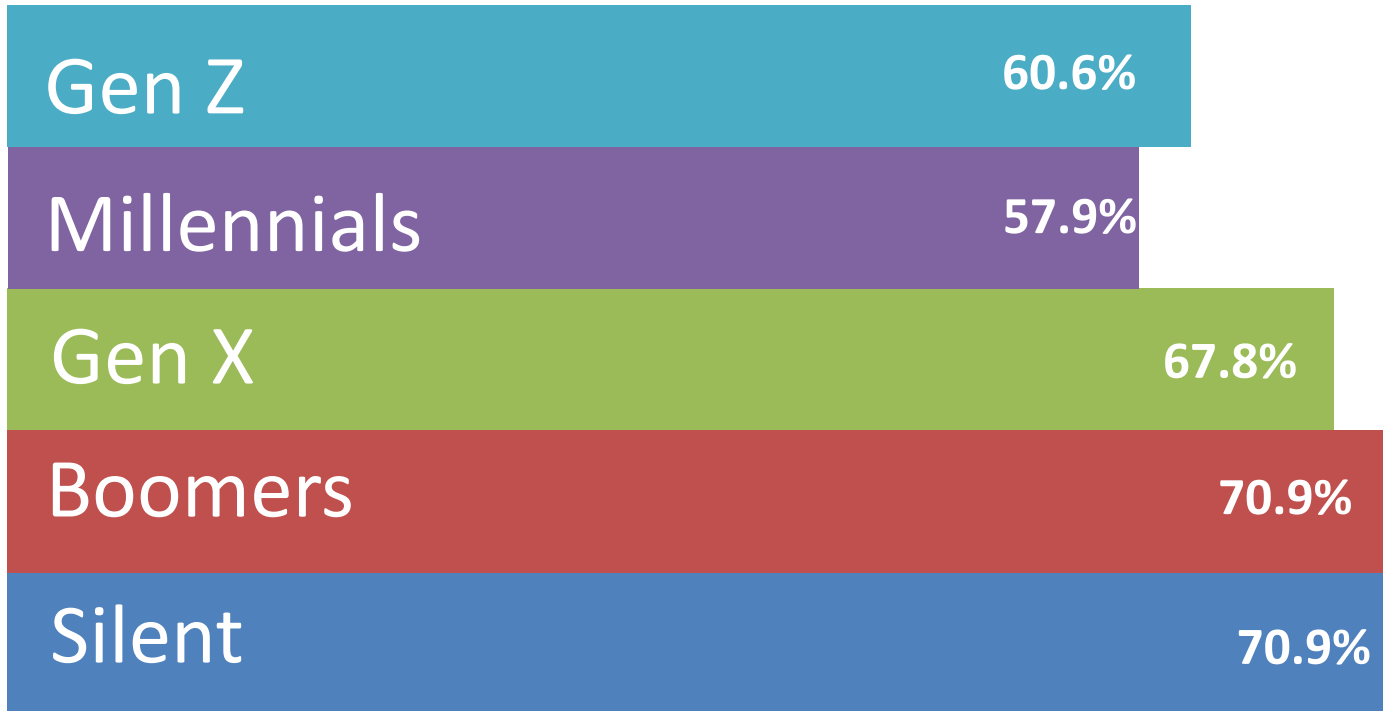
(INTEREST IN PRE-INSTALLED WI-FI)

62%

Very Important or Won't Rent Without

WHAT DO THE RENTERS SAY?

(INTEREST IN PRE-INSTALLED WI-FI BY AGE)



KEY FEDERAL POLICY AREAS

- FCC REGULATORY LANDSCAPE
- BEAD PROGRAM—BROADBAND INFRASTRUCTURE FUNDING
- AFFORDABLE CONNECTIVITY PROGRAM (ACP)



NMHC **OPTTECH**
CONFERENCE & EXPOSITION

NOVEMBER 01-03, 2023
WYNN RESORT | LAS VEGAS

[NMHC.ORG/OPTTECH](https://nmhc.org/opttech)

SIMPLY EXCEPTIONAL CONNECTIONS™ NATIONWIDE

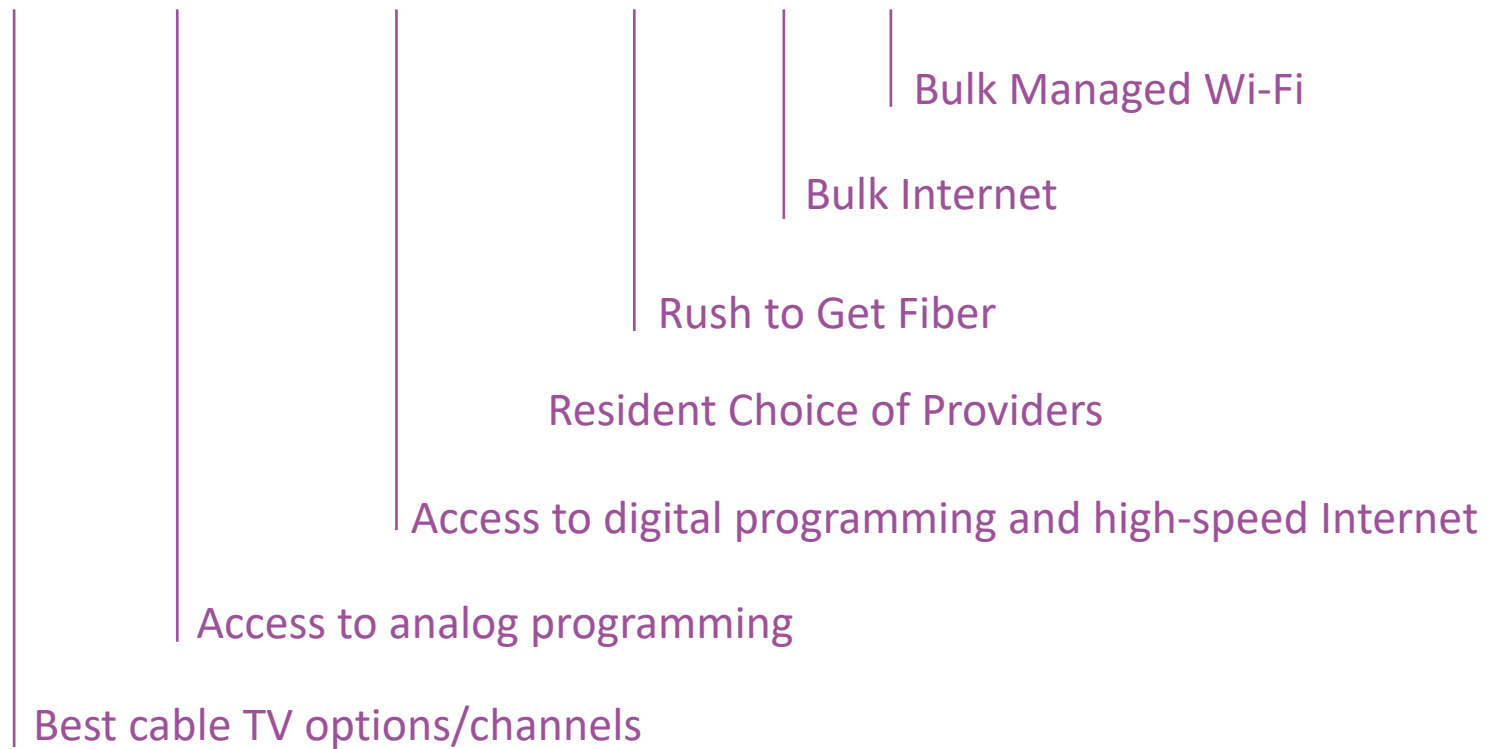


Managed Wi-Fi: How We Got Here and Why It Matters?



Bryan Rader

President of MDU
Pavlov Media
314.540.1114



MDU Owners always sought several key features/benefits from their service providers:

- Resident convenience/experience
- Economic incentives
- Common area/office solutions
- Distinction versus their competitors (ex higher speed offerings, better price, quicker service)
- Create “value” for their residents



- Developers and owners have expanded the multifamily resident experience with high-end amenities.
- Today, we see everything: pickleball, yoga studios, pet spas, expansive fitness centers, cardio rooms, cyber café, rock climbing walls, golf simulators, EV charging stations.
- All of these amenity locations require “connectivity.”



- Multifamily residents tend to be younger than national average.
- They were the first to “cut the cord.”
- Heavier users: gaming, streaming, remote learning
- Work-From-Homes.

All of this drove up usage/demand for better connectivity.



- The advent of smart home (IoT) features has created greater opportunities for MDU owners.
- Creates a way to improve management of the entire community: vacant units, access control, thermostat control, leak detection.
- Offers new features for incoming residents to also improve how they live in their apartment.
- “Making multifamily feel like single-family”



- MDU Owners want resident convenience/experience/value
- Amenity areas in multifamily have expanded dramatically
- Resident's internet usage has quadrupled
- Smart home features lead to great property management efficiencies
- Economic options

That's "How We Got Here."

- Perfect "infrastructure" solution to address all of these "themes."
- From move-in to Move-out (seamless onboarding and offboarding)
- On-site property staff usage (leasing, maintenance)
- Better resident experience: connectivity at home, and throughout all amenity spaces.
- Seamless. Safe. Symmetrical.

Solving for These Issues Has Driven The Growth of Managed Wi-Fi.



Daran Hermans

Cambium Networks Enterprise Wi-Fi Product Manager

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Agenda

Wi-Fi 6 and 6 GHz Wi-Fi

Mixing Wi-Fi 4, 5, 6, 6E at the same property

Wow the tenant with personal and private Wi-Fi

Primer on **Wi-Fi names** – don't let the “6” fool you

GREEN = 2.4 GHz (original Wi-Fi) **GOLD** = 5 GHz (most common) **BLUE** = 6 GHz Wi-Fi (latest and greatest)

Wi-Fi **4**  

Very old, slow, hard to stream over Wi-Fi 4. Works well for consumer IOT devices

Wi-Fi **5** 




The most common for tenant PC, game console, phones, tablets. Only supports **5 GHz**

Wi-Fi **6**  

Excellent for streaming, high density. Supports both **2.4 GHz** and **5 GHz**

Wi-Fi **6E** 

Same as Wi-Fi 6 but runs in the new **6 GHz Wi-Fi frequencies**. Very fast, high density

Wi-Fi **7**   

Also runs in **6 GHz Wi-Fi**. Expected release in 2024, will take another 18 - 24 months to reach maturity

6 GHz Wi-Fi: biggest expansion in 20+ years

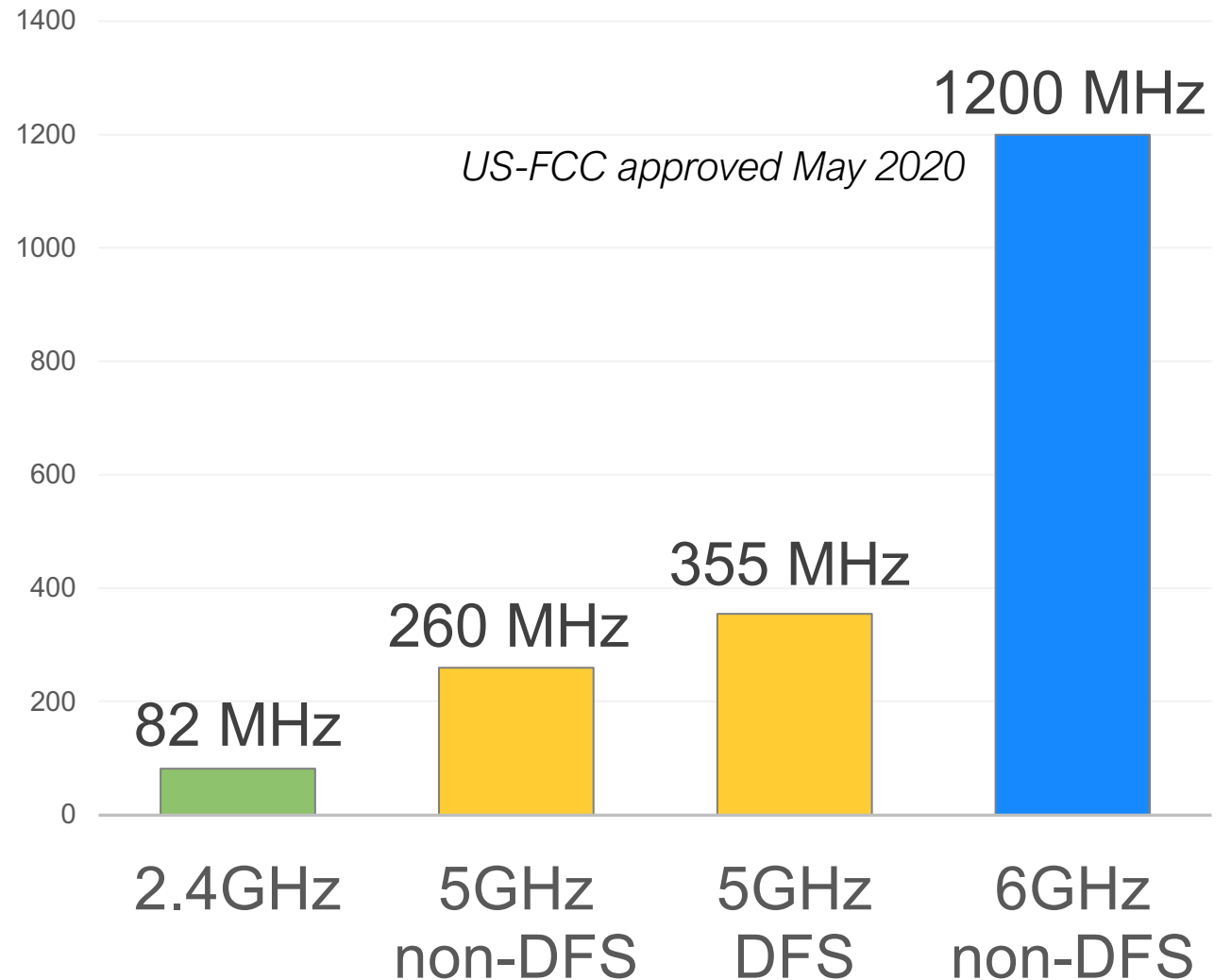
NA Wi-Fi Allocated Spectrum

6 GHz supported by:

not Apple iPhone 14...

likely in iPhone 15....

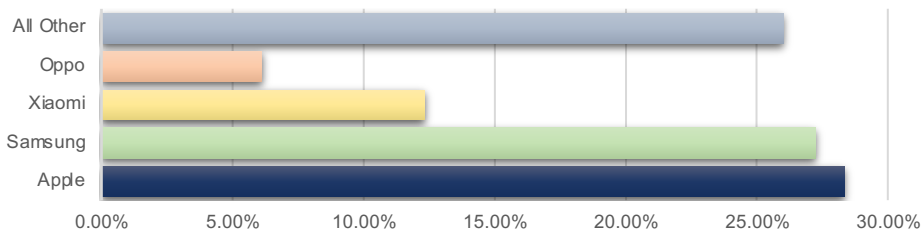
Samsung, Google, other Android
Macbook Pro, iPad Pro



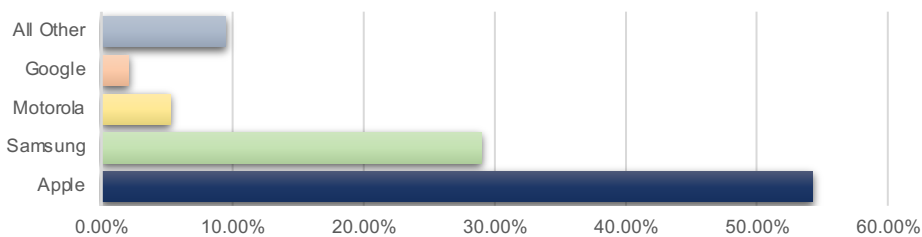
Mobile Vendor Market Share – Impact on 6 GHz



Mobile Vendor Market Share - Worldwide. June 2022 - June 2023



Mobile Vendor Market Share - North America. June 2022 - June 2023



Worldwide

6 GHz predicted	Oct-23	Oct-24	Oct-25
Apple	0.0%	11.3%	22.7%
Samsung	9.0%	18.0%	27.0%
Xiaomi	4.1%	8.1%	12.2%
Oppo	2.0%	4.0%	6.0%
All Other	6.5%	13.0%	19.5%
Sum	21.6%	54.5%	87.4%

North America

6 GHz predicted	Oct-23	Oct-24	Oct-25
Apple	0.0%	21.7%	43.4%
Samsung	9.6%	19.1%	28.7%
Motorola	1.7%	3.5%	5.2%
Google	0.7%	1.4%	2.1%
All Other	2.4%	4.7%	7.1%
Sum	14.4%	50.4%	86.5%

Factors that determine the Smartphone 6 GHz prediction

- Smartphone refresh cycle
- When Apple supports it

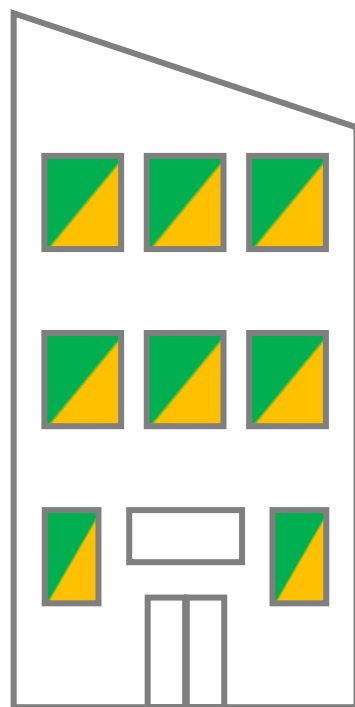
PREDICTION by October 2024.....

~50% of mobile devices in North America will support Wi-Fi **6E** or Wi-Fi **7**

Mix Wi-Fi 6 with Wi-Fi 6E (6 GHz)

Wi-Fi Name: Elm Street Apartments

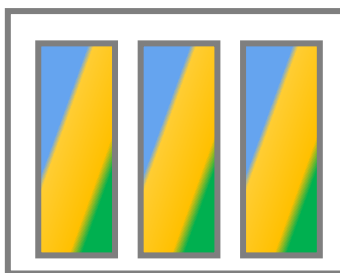
Wi-Fi 6 in the apartments



Tenant Apartments



Wi-Fi 6 and 6E in high density areas

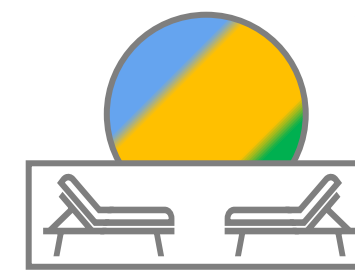


Exercise room /
Laundry / Lobby



Wi-Fi 6 outdoor areas
Coming soon to the US....

Wi-Fi 6E approval for outdoor



Pool

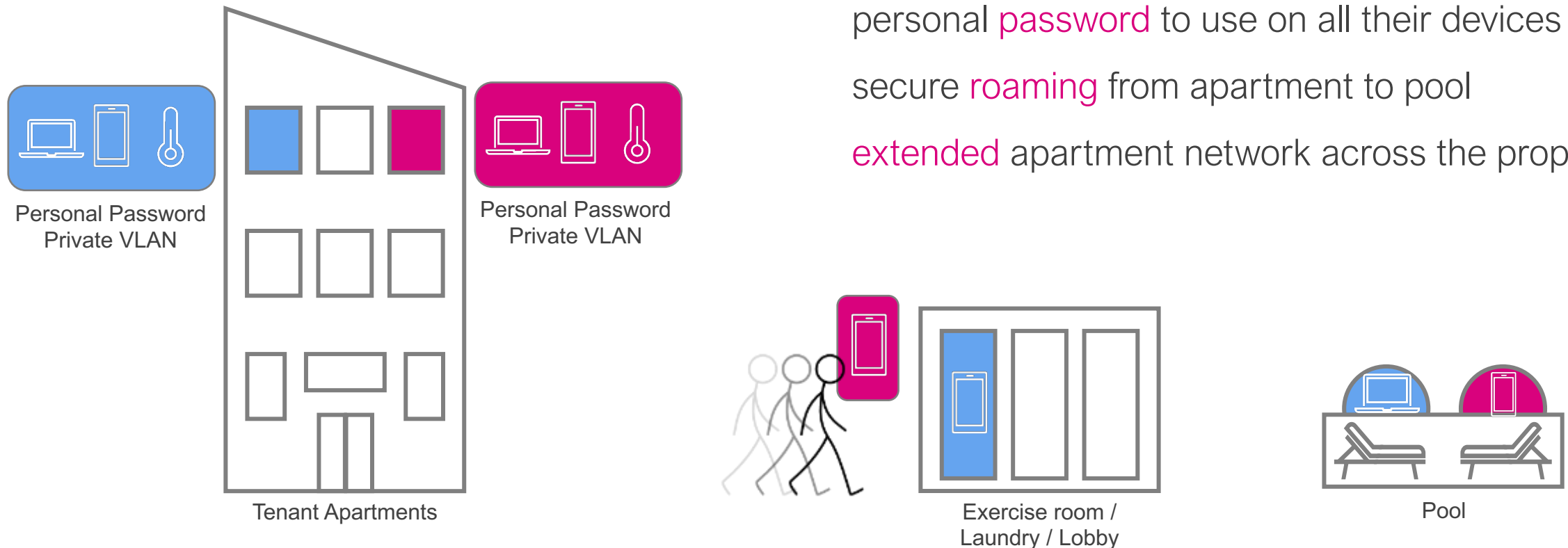


Get **Personal** with Wi-Fi but keep it **Private**

Wi-Fi Name: Elm Street Apartments

Every tenant gets:

- personal **password** to use on all their devices
- secure **roaming** from apartment to pool
- extended** apartment network across the property



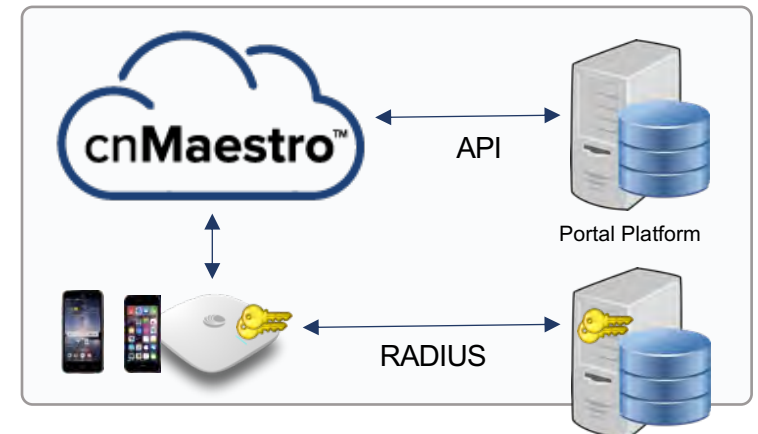
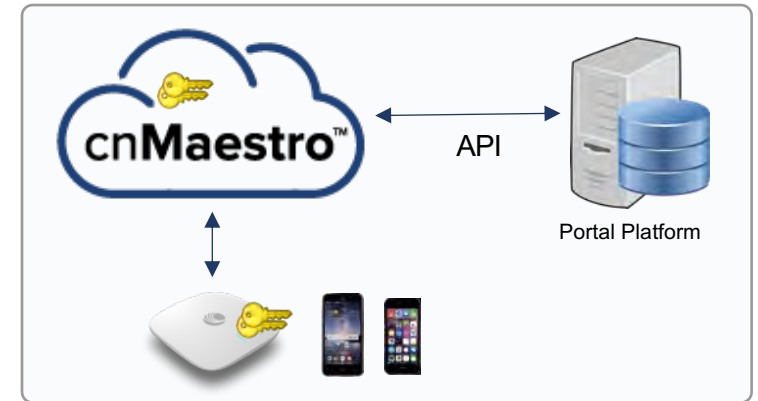
Cambium Scalability

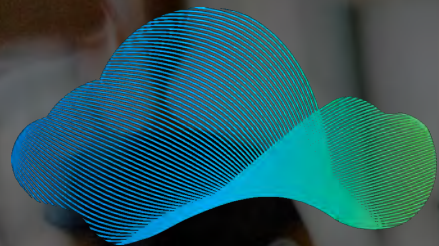
2000 keys cached per access point = fastest roaming

50,000 keys per cloud account = one database

Bound MAC = lock down one device per private key

UnBound MAC = tenant assigns to all their devices





Cloud5
COMMUNICATIONS

Cloud5 Communications

Maravedis MDU Online Summit August 2023

Managed WIFI – What Matters Most to Owners and to Residents

There's a
Better
Way to
Connect

What Matters Most to Owners & Residents

1. Property-Wide Managed WIFI (curb to curb)
 - Continuous Network
2. Reliable - Always On
 - Redundancy
3. Fast
4. Great Support



Cloud5 Managed WIFI



End-to-End Managed WIFI Solutions

- High Speed Internet & WIFI
- Custom Network Design
- Network Management

Resident Internet Solutions

- Simplified resident onboarding
- Multiple resident device support
- Increased security with resident device isolation
- Flexibility to move throughout the property while staying connected to home network
- SD-WAN for unified WAN management with high availability
- Granular per unit bandwidth and traffic management for tiered services and upsell
- Detailed usage analytics per unit & property

24x7 Property Care: Resident & Associate Support

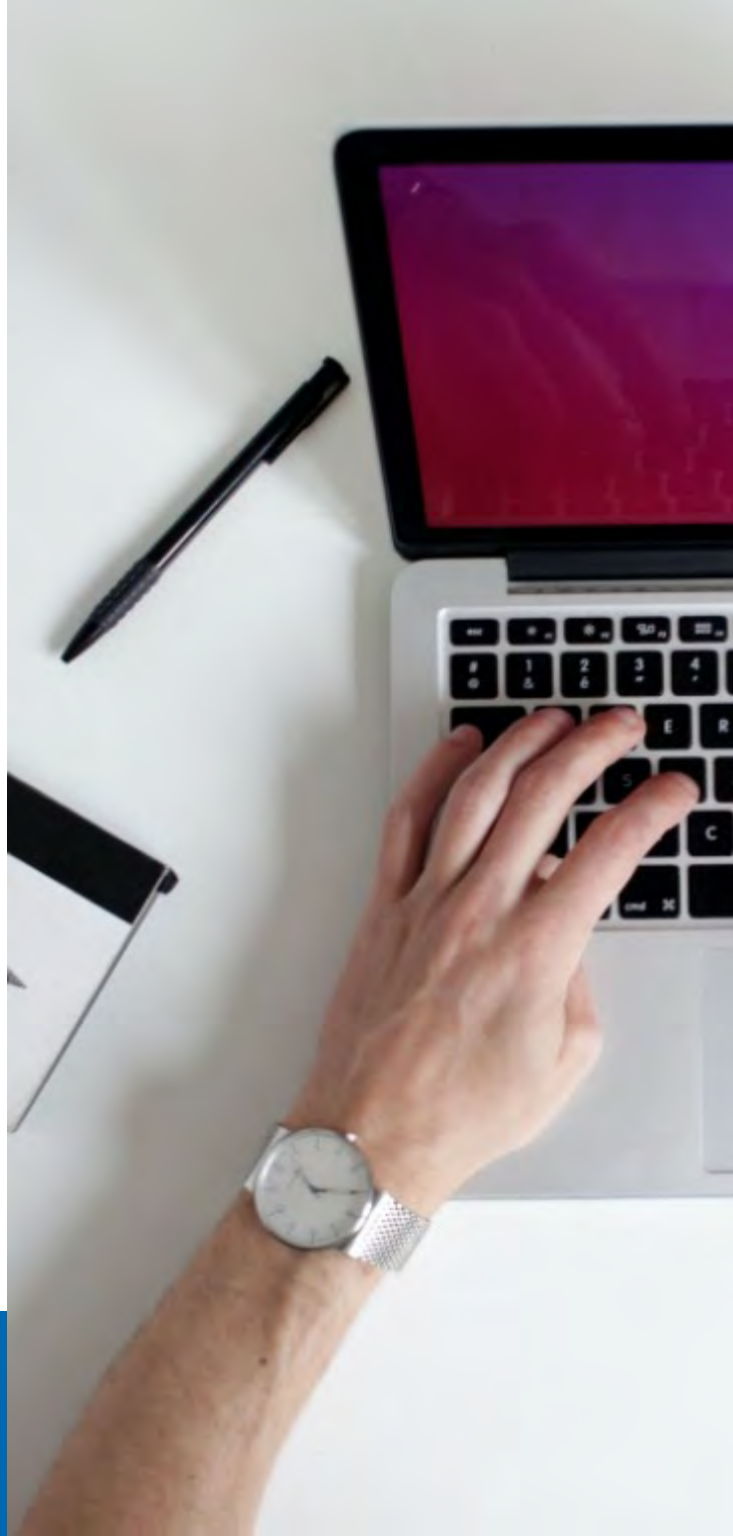
- Proactive Network Monitoring & Analytics Dashboards

Who is Cloud5?

We are the leading provider of communications solutions and managed technology services for more than **5,000** hotels, MDUs, and commercial facilities across the Americas.

We Cover all your Asset Classes!

HQ'd in Chicago, IL



Managed WIFI



Telephony



Managed IT Services:
Vendor Management



In-Room Entertainment:
Powered by PureHD



Contact Center
Services

CLOUD5 STRENGTHS

Experienced

- **Communications industry leader** for Managed WIFI, converged networks and voice for more than **17 years**
- Experience designing and deploying complex networks to meet unique needs by pulling together components from the most suitable partners

Proven

- Decades of experience driving emerging communication technology into maturity
- Serves leading brands including **Brookfield, Alliance Development, Responsible Residential, Marriott*, Hilton, Hyatt, G6 Hospitality, LaQuinta, Extended Stay America and more**

Proficient

- Collaborative partnerships with OEMs
- End-to-end WIFI services including **dynamic design, installation and support**
- **National network** of in-field technicians and installers
- **Network platform** for network performance and analytics

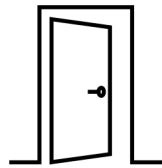
Backed by the Best

Owned by Oaktree Management Capital L.P. / Brookfield Asset Management, Inc.

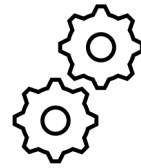


Cloud5 Managed WIFI Compared to Traditional Cable/MSO

Managed WIFI solutions that enable properties to provide residents with secure WIFI across the entire community into each residential unit all through a simple activation process.



Better resident experience & enhanced competitive edge



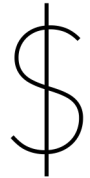
Built in troubleshooting & IT resources



Infrastructure that supports long-term connectivity needs



Standardization of business model drives consistency and cost efficiencies



Ancillary revenue, increased property valuation and NOI

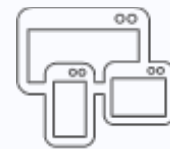
Cloud5 by the Numbers



5,000+ Clients



1,200+ Employees



**100,000+ Managed
Devices**



**4.1 Million
Reservations**

Valued at \$1+ Billion

We Serve the Industry's Leading Brands





Shayne Rose

National Director, Managed WiFi Solutions, MDU

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E: Shayne.Rose@Cloud5.com





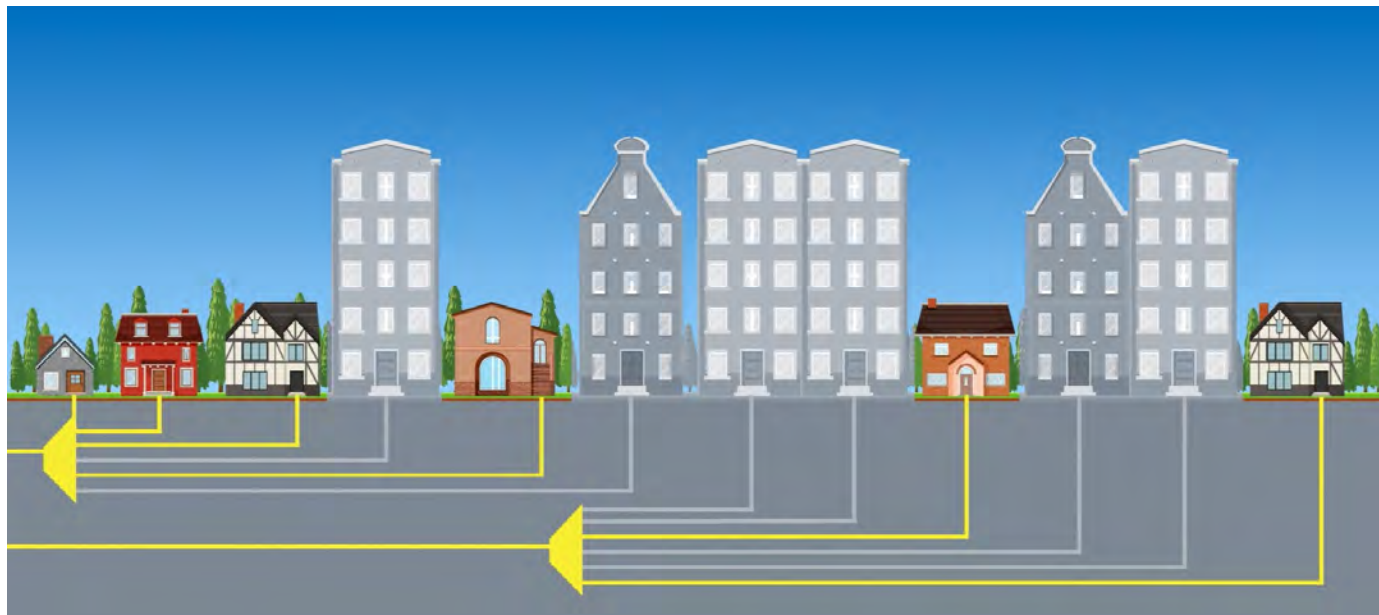
POSITRON
Access Solutions



**Managed Wi-Fi in Brownfield MDUs:
An impossible challenge? NOT**

Current Situation: MDUs are often bypassed by Fiber

BSPs have been so focused on deploying more fiber miles and serving SFUs that they are bypassing Brownfield MDUs. **This results in a Fiber Divide and the inability to efficiently offer Managed Wi-Fi**



Managed Wi-Fi in Brownfield MDUs: Mission Possible

Availability of Managed Wi-Fi in the MDU remains very limited

LESS THAN 10% in recent / Greenfield MDU

LESS THAN 1% in Brownfield MDU

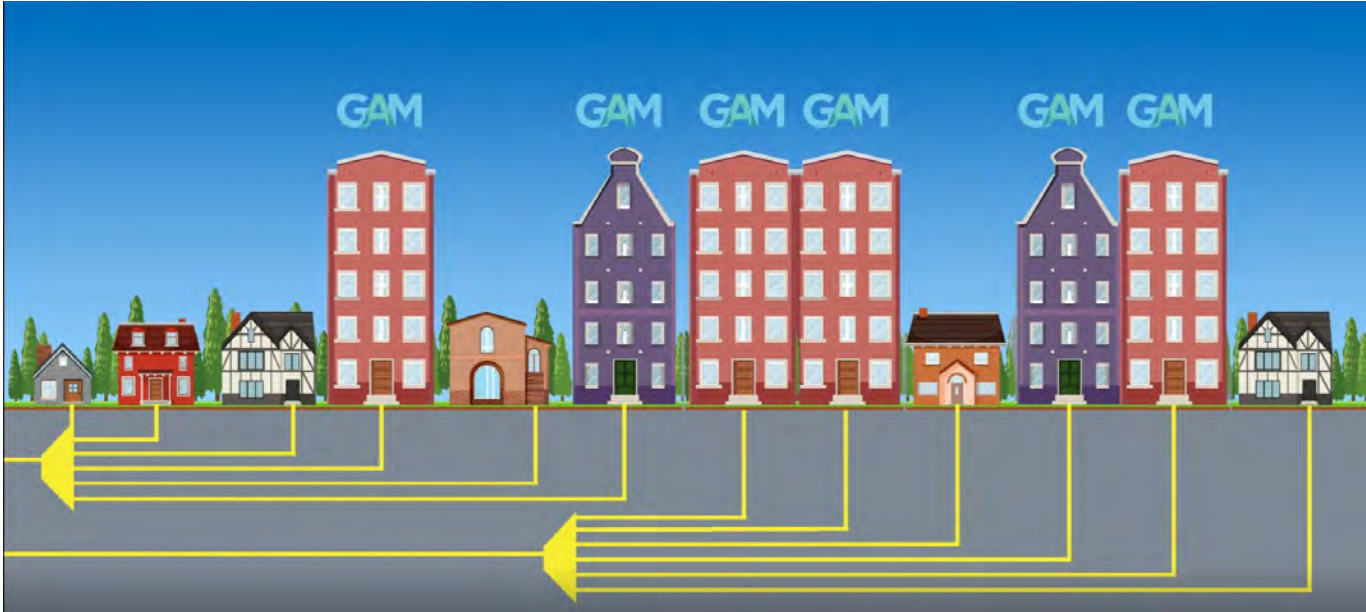
Yet, over 25% of the USA population lives in MDUs and can be as high as 70% in Europe and Asia

Mostly due to the lack of a suitable “**in-building Gigabit Ethernet infrastructure**”, especially in the Brownfield MDU market (\pm 90% of the market)

Let's examine the answer to this challenge with 3 simple steps.

STEP #1: Extend Broadband from Fiber / FWA inside the MDU

Re-using the existing telephone pairs or coaxial cabling for Gigabit Ethernet cost effectively & easily transforms bypassed MDUs into subscribers, **eliminating the Fiber Divide and enabling Managed Wi-Fi**

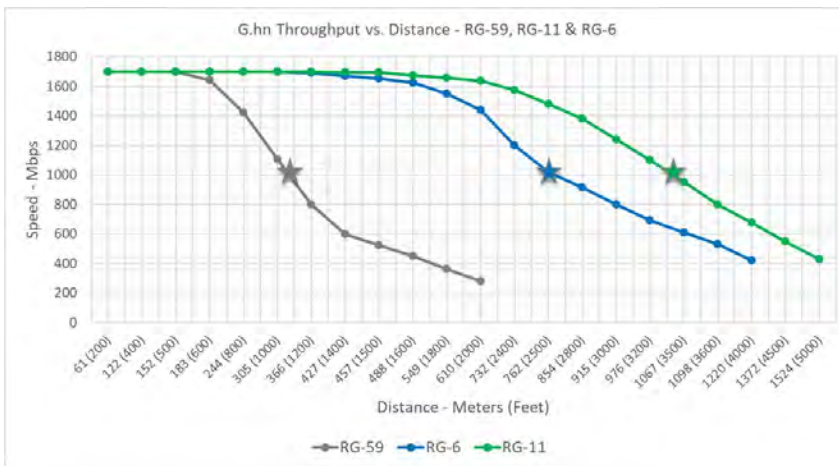


NOTE: *Fixed Wireless (mmWave) is increasingly used whenever fiber is not possible in a market*

STEP #2: Use G.hn for Gigabit over Legacy Wiring



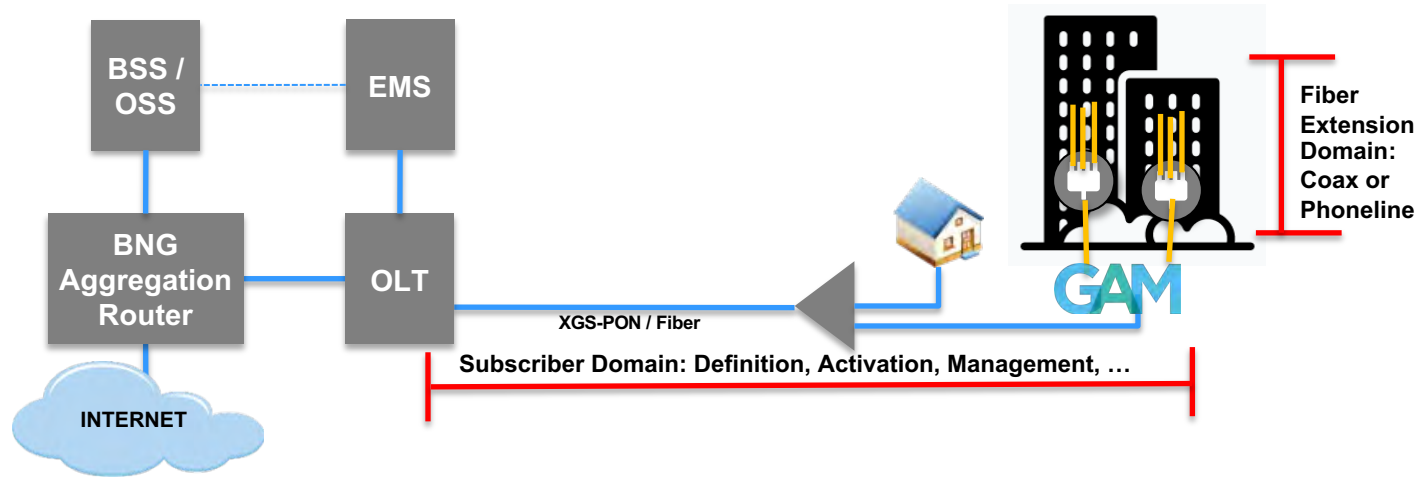
- **G.hn** is an ITU-T standard (G.9960 series)
 - March 2016 ITU-T extended specification (referred to as WAVE-2) to include signaling over telephone wire and coax to provide Aggregate Ethernet rates of 1.7 Gbps with dynamic allocation
- **G.hn** extends Gigabit Ethernet over existing telephone wire (800 feet/ 250 meters) or COAX (2600 feet / 800 meters) with installation & activation in hours - not weeks!



STEP #3: Combine XGS-PON & G.hn

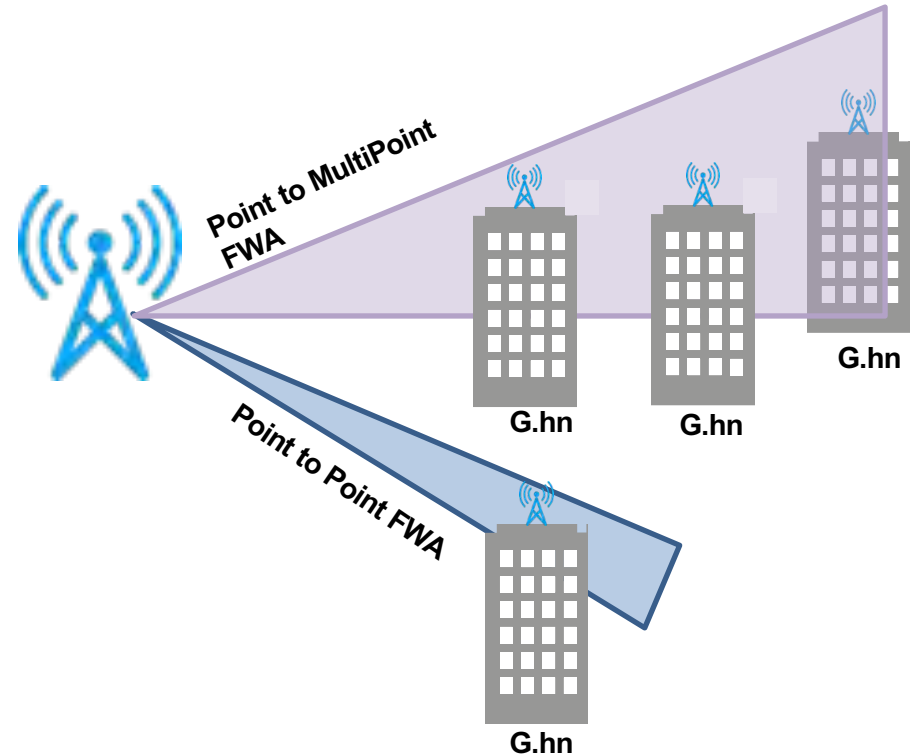
Combination of G.hn with XGS-PON ensures seamless flow-through provisioning (same as SFU) for MDU subscribers. GAM becomes a multi-subscriber ONT.

G.hn enforces Services & Bandwidth Profiles, even when Roaming across MDU.



STEP #3: Fixed Wireless Access Extension over G.hn

- Similar integration as with XGS-PON
- Combining mmWave Fixed Wireless Access with G.hn offers 1-10 Gbps of bandwidth to distribute to the MDU tenants
- COAX and/or Telephone pairs are then used with G.hn to deliver Gigabit services to the tenants



G.hn: Key to unlock Gigabit Broadband / Managed Wi-Fi

STEP #1: Extend Broadband from Fiber / FWA inside the MDU

STEP #2: Use G.hn for Gigabit over Legacy Wiring

STEP #3: Combine XGS-PON or FWA with G.hn

You are now ready to deploy and operate Managed Wi-Fi across any Brownfield MDU

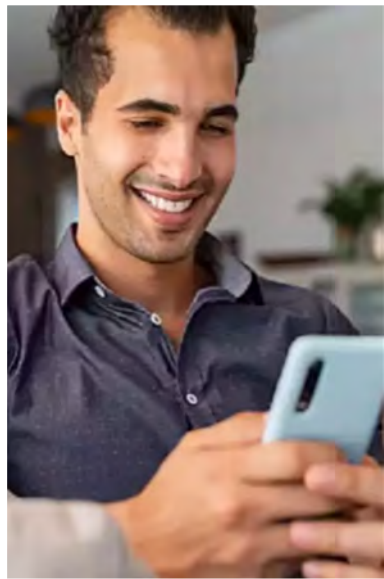




Thank you!

ptrudeau@positronaccess.com

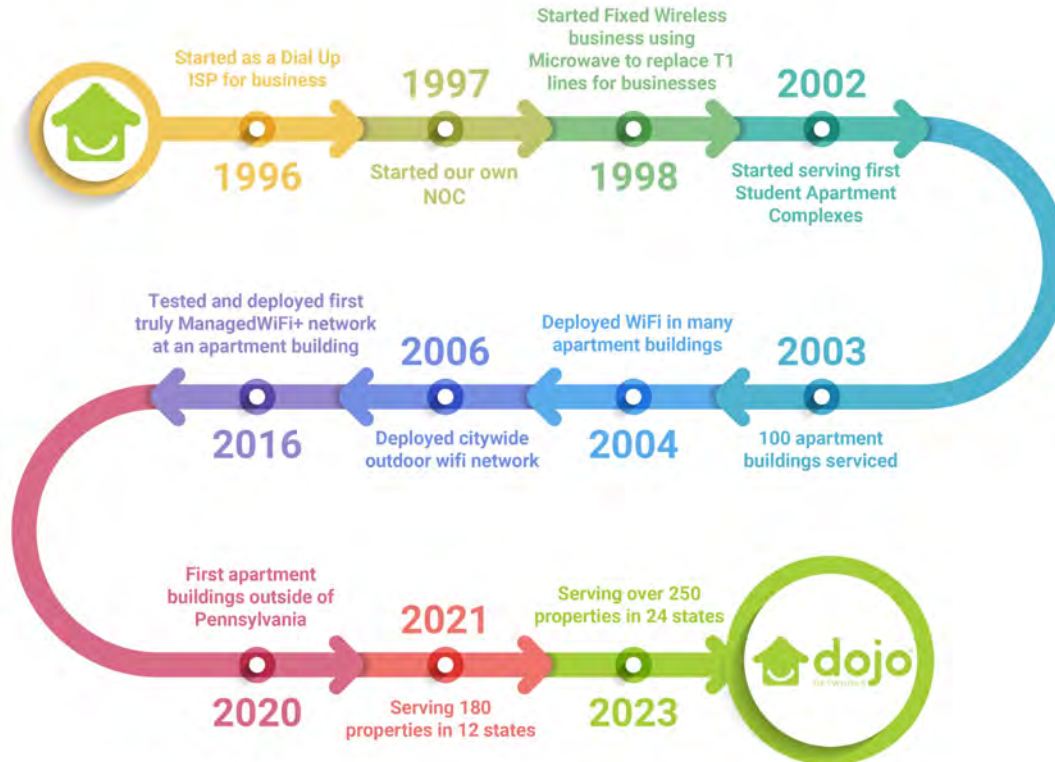
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Achieving Winning Deployments: The Ingredients of Successful Owner & Provider Partnerships



About Dojo





Vice President of Sales

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- **1989 - Began 30+ year career in telecommunications**
- **2006 - Launched Multifamily sales division for the nation's 2nd largest cable operator**
- **2020 - Joined DojoNetworks**

Achieving Winning Deployments: The Ingredients of Successful Owner & Provider Partnerships

- **Assess Situation**
- **Partner Selection**
- **Formalize Partnership**



Assess Your Current Situation

- Define your tenant & property needs
- New build vs existing properties
- Property type (garden, mid-rise)
- Timeline to service activation
- State of wiring (existing properties)
- Review existing contracts
- Understanding FCC rules



Assess Your Current Situation

Design Considerations

- Ethernet vs. fiber to the unit
- Indoor & outdoor common areas
- IoT & smart apartment devices
- UPS battery backup
- Cellular out-of-band console server
- Redundant circuits
- Protection against technology obsolescence



Selecting Your Partner

- How long have they been in business?
- Experience with your property type?
 - Conventional
 - Student
 - Senior
 - Affordable
- How many properties do they serve today?
- What is their approach to design?
- Do they provide a frictionless onboarding experience?
- What is their call ratio per customer per year average?
- What is their speed of answer?
- Do they integrate with your PMS?
- How fast do they resolve tickets?
- Do they provide references?



Formalize Your Partnership

- **Finalize business terms**
 - Is the contract mutual?
 - What's included?
 - Owner vs. Partner responsibilities
 - Options for underperforming
- **Review the post-contract process**
 - Kick-off call
 - Cadence meetings
 - Marketing support
 - Resident onboarding



**“Success is best when
it’s shared.”**

Howard Schultz
Founder of Starbucks

