

The 4G/5G Indoor coverage challenge

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4G vs 5G indoor

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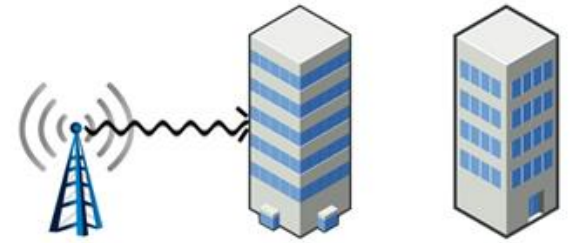
Deployment options

3

Recommendations



4G (700~2700MHz)



5G (30~70GHz)

4G vs 5G indoor



Multi-Gbps data rates
With large bandwidths (100s of MHz)

Much more capacity
With dense spatial reuse

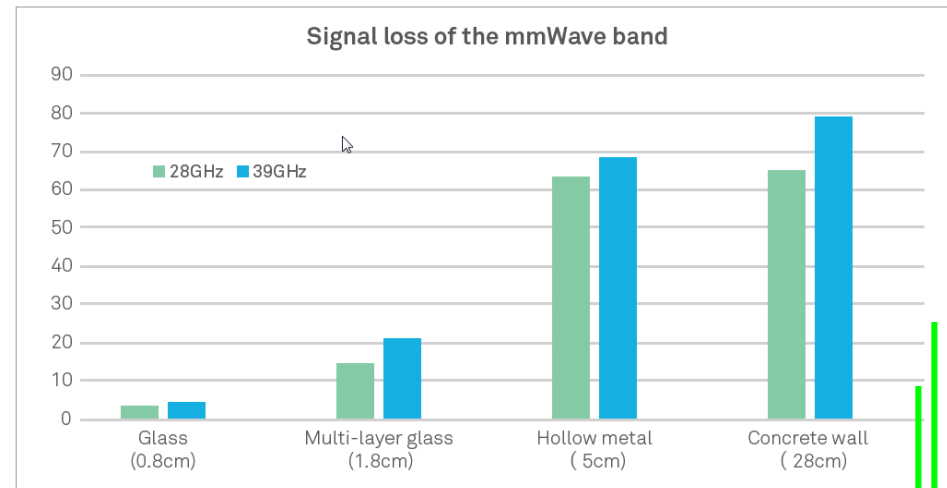
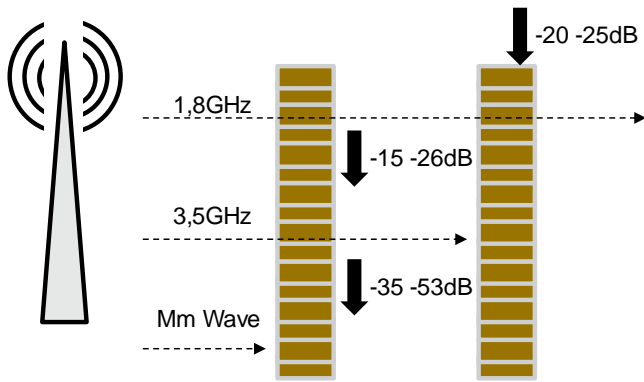
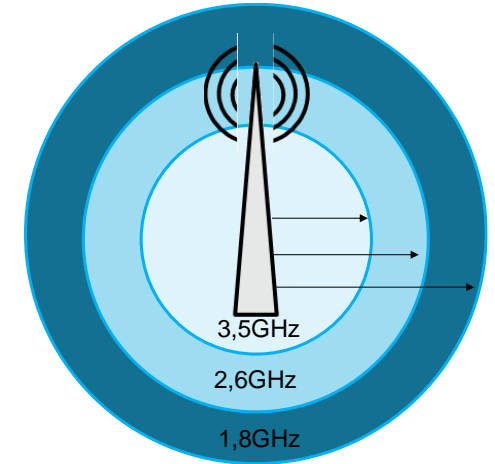
Flexible deployments
Integrated access/backhaul

Wave propagation below and above 6GHz have been intensively tested.

28GHz and 39GHz doesn't show large discrepancies

Above 6GHz, signal loss is huge

Mw wave doesn't propagate indoor



Deployment options

Study on the US market

Number of commercial building (u)

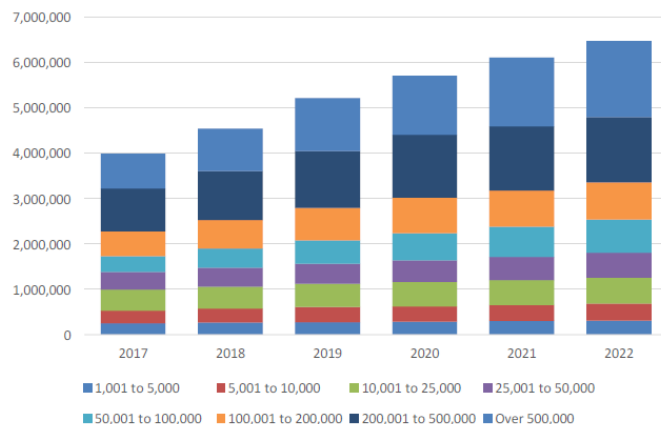
Building floor space (square feet)	Number of buildings (000)	Percent
10,001 to 25,000	882	15.9%
25,001 to 50,000	332	6.0%
50,001 to 100,000	199	3.6%
100,001 to 200,000	90	1.6%
200,001 to 500,000	38	0.7%
Over 500,000	8	0.1%
All buildings	5,557	100.0%

Source: CBECS, 2016

- 5,5 millions of commercial building
- 50% are less than 5000sqft
- 70% are single store

Study on the US market

TAM – number of nodes per building size (sqft)



Source: IGR, 2018

- ≈ 6,3 millions of nodes by 2022
- ≈ 150€/node (structured cabling only)
- ≈ 1b€ of structured cabling TAM

Deployment options

4G/4.5G Era , **Indoor Coverage** is the key to Operator Success

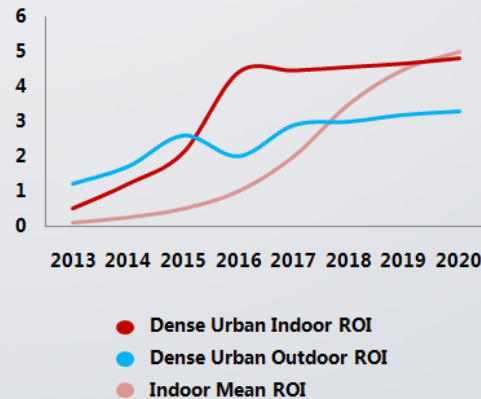
Outdoor
20%



Indoor
80%

Unbalance Traffic Distribution

ROI : Indoor vs. Outdoor



- OK for LTE
- Limited evolution
- Cost of cable/connectivity



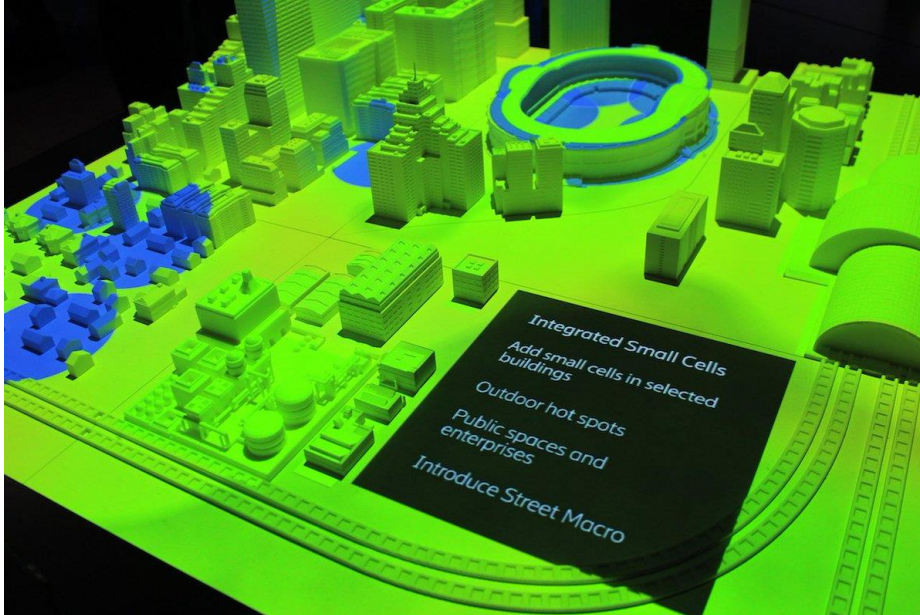
- LTE and 5G
- Multi operator, multi band
- Easy to install (RJ45, LC)



- Small and medium size is not addressable by carriers
- 3rd party structured cabling vendor required

2

Deployment options



Covering a stadium is not as covering an office building

Building owners and tenants have different objectives

The need of tomorrow is unknown and not today's one



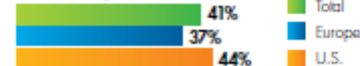
Tomorrow, a building with a poor mobile coverage will look for tenant

What impact does wireless connectivity have on the desirability of a building?

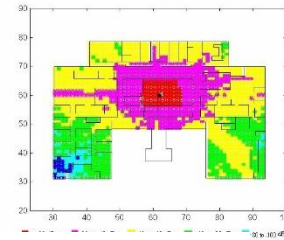
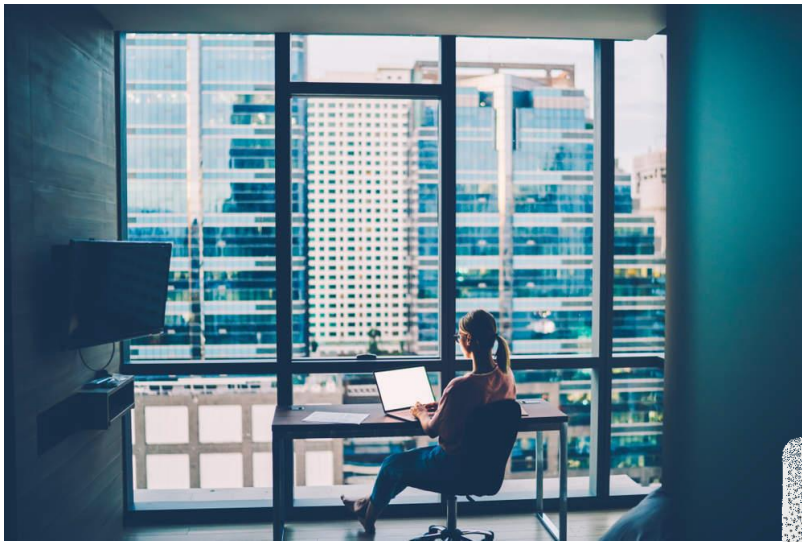
Make the building more desirable to lease/own



Create a greater return on the building asset



Let's focus on enterprise indoor coverage



Coverage study

Equipment selection



Cable selection

3

Recommendations



Requirement per antenna

LTE	800 Mbps
5G	2Gbps, 10Gbps, 25Gbps

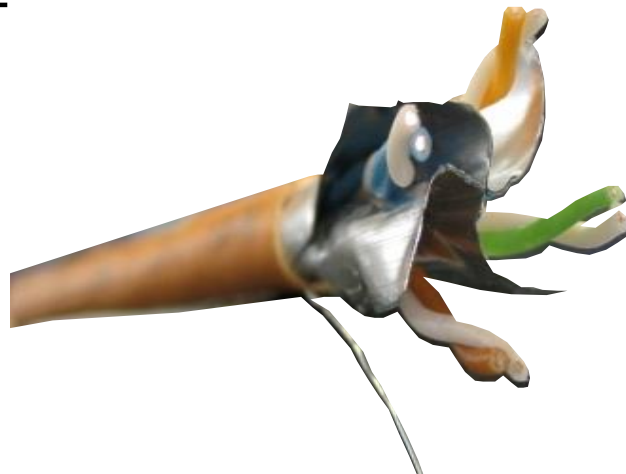
Power POE

Fiber and copper?
 Fiber only?
 Copper only?

- 1 antenna / 100m²
- 1 antenna / 200m²
- 1 antenna / 500m²
- 1 antenna / floor
- ...

Conclusion

- Indoor coverage is critical for enterprises and building owners
- Implementing a structured cabling system with the right methodology are the only way to provide the service on the long term while saving on cost
- Use standard and well known technologies: twisted pairs cables with RJ45 connectivity for data with POE



Thank you!

The logo for Nexans, featuring a stylized red 'N' followed by the word "exans" in black lowercase letters.