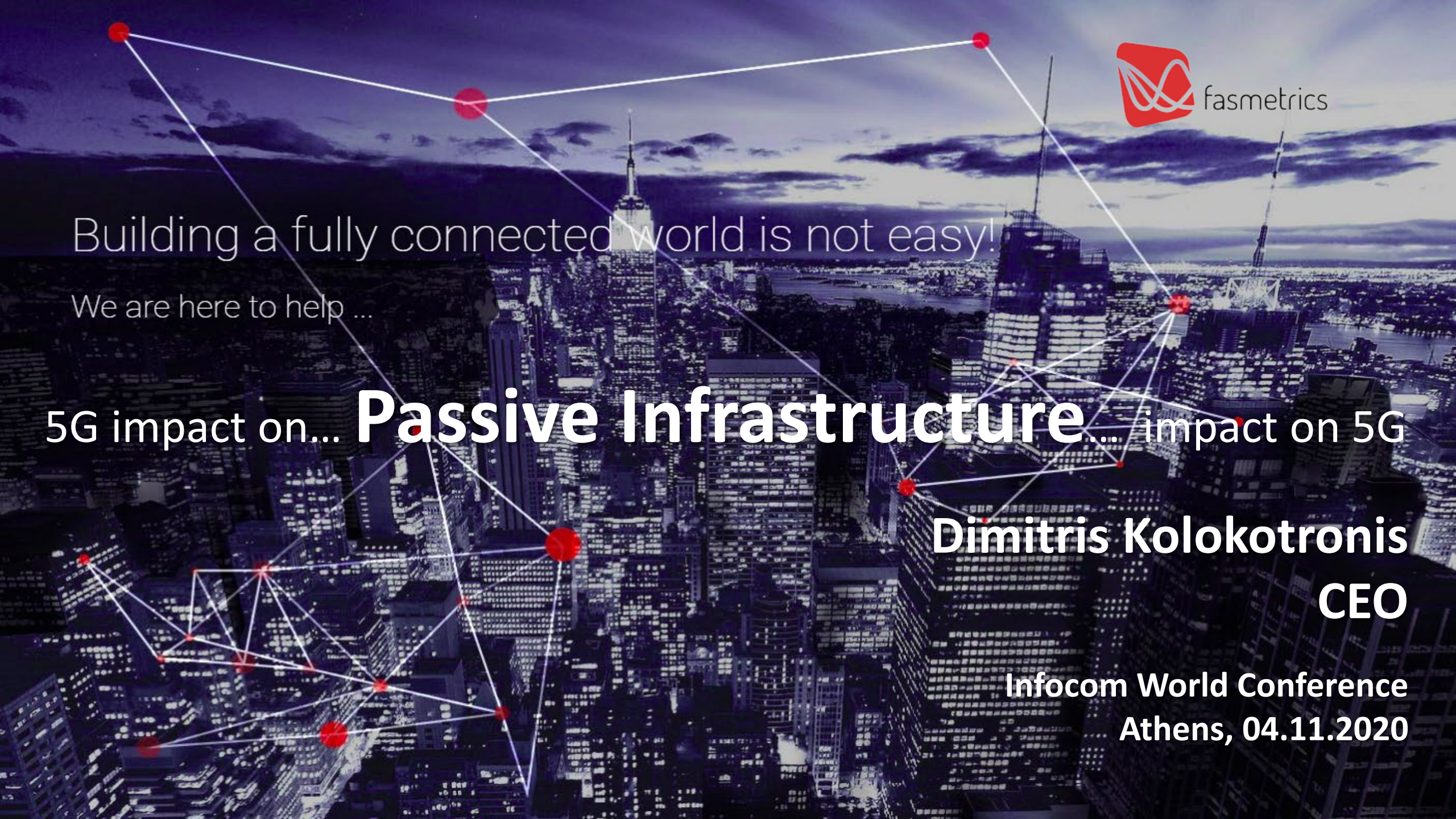

5G impact on… **Passive Infrastructure**… impact on 5G

Dimitris Kolokotronis
CEO

Infocom World Conference
Athens, 04.11.2020

The truth of REAL 5G!

Mobile network operators considered to be technology companies… today are a commodity! An over-borrowed commodity (…structured as a high-tech business!) that needs to roll-out the very expensive 5G networks in order to stay around…

Who is paying for that?

https://www.washingtonpost.com/business/in-the-age-of-5g-the-hottest-telecom-assets-are--towers/2019/11/18/08faa784-09d6-11ea-8054-289aef6e38a3_story.html

What is happening with Telecom Towers?

Mobile network operators have towers in their balance sheet… but as a liability NOT as an asset (…although IFRS do miracles)! For High-Tech businesses (as MNO's) Towers are just a bunch of steel anyway…

Morgan Stanley

FINANCIAL TIMES

"Towers of power: European telcos find value in masts"

CNBC

MAD MONEY w/ JIM CRAMER

Monday - Friday, 6:00 - 7:00 PM ET

VIDEO | FULL EPISODES | PODCAST | CRAMER'S COVID-19 INDEX | CRAMER'S SOUNDBOARD

MAD MONEY

The 5G rollout has cell tower stocks in 'raging bull market mode': Cramer

PUBLISHED THU, MAY 23 2019·6:29 PM EDT | UPDATED THU, MAY 23 2019·7:26 PM EDT

ΕΙΔΗΣΕΙΣ | ΠΟΛΙΤΙΚΗ | ΟΙΚΟΝΟΜΙΑ | ΕΠΙΧΕΙΡΗΣΕΙΣ | ΔΙΕΘΝΗ | ΑΡΘΡΑ | ΜΕΤΟΧΕΣ | TAX | FOREX | ΑΓΟΡΕΣ

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DAX 11.851,88 (+0,54%) · CAC 4.733,88 (+0,91%) · Dow Jones 26.925,05 (+1,60%) · Nikkei 23.295,48 (+1,39%) · EUR / USD 1,16741 · EUR / CHF 1,07126

Αναζήτηση Μετοχής ή Είδησης — ΓΕΝΙΚΟΣ ΔΕΙΚΤΗΣ: 17:19 572,88 +0,59% +3,38 Τζίρος: 45,17 εκ. €

ΣΥΝΕΧΗΣ ΕΝΗΜΕΡΩΣΗ 10:13 | Διεθνής διάκριση για τις υπηρεσίες θεματοφυλακής της Τράπεζας Πειραιώς

ΕΠΙΧΕΙΡΗΣΕΙΣ

Κυριακή, 16-Αυγ-2020 08:53

Νέο τοπίο διαμορφώνει σε Ευρώπη και Ελλάδα η Vantage Towers

CNN

MARKETS NOW

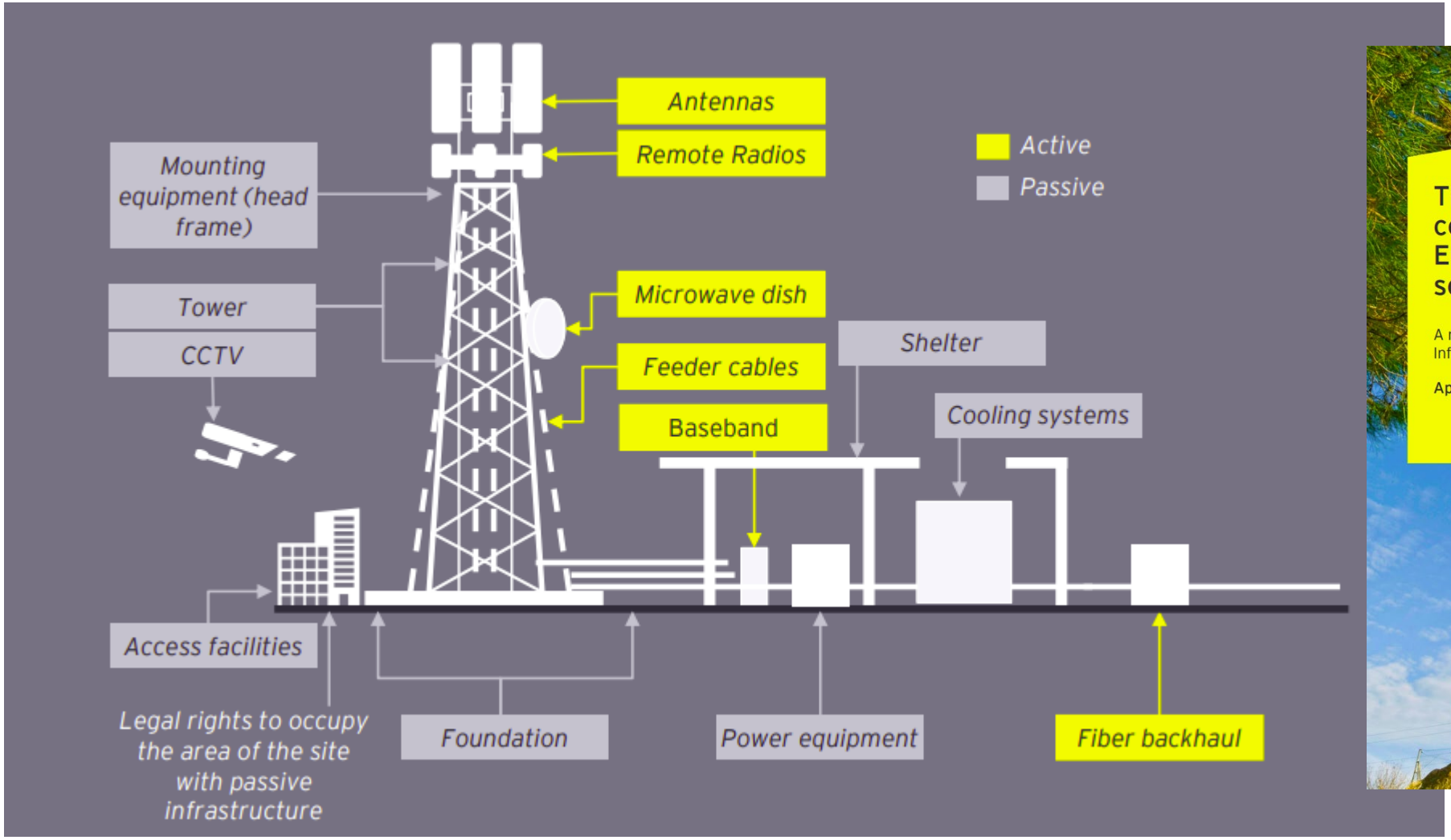
The real 5G winners: Tower companies

By Paul R. La Monica, CNN Business

Updated 1602 GMT (0002 HKT) February 26, 2019

What is network's passive infrastructure?

The structures on which mobile operators install their antennas… i.e. masts & towers



Passive Infrastructure (Towers & Masts) for Sale!

…indeed, we have started to see MNOs highlight their tower ownership and value by carving out separate tower vehicles, IPOs, mergers or even sales to independent TowerCos or private equity…

A second area to watch is an unfolding valuation arbitrage opportunity between MNOs and Tower Companies (TowerCos). Essentially, **MNOs are trading at 7x EBITDA** — earnings before depreciation, amortization, interest, and taxes — while **TowerCos are trading at 22x EBITDA** — three times the MNO valuation level. Since ***MNOs are the biggest tower owners in Europe — with 80% of sites — they are potentially sitting on a large opportunity.***

https://www.morganstanley.com/ideas/europe-telcos-5G-wireless-infastructure

So… will the tower cash finance 5G roll-out?

fasmetrics

Part 1: Passive Infrastructure… impact on 5G

Yes!

Next big deal in Greece? OTE Towers!
They are going to… DT?

Executive summary

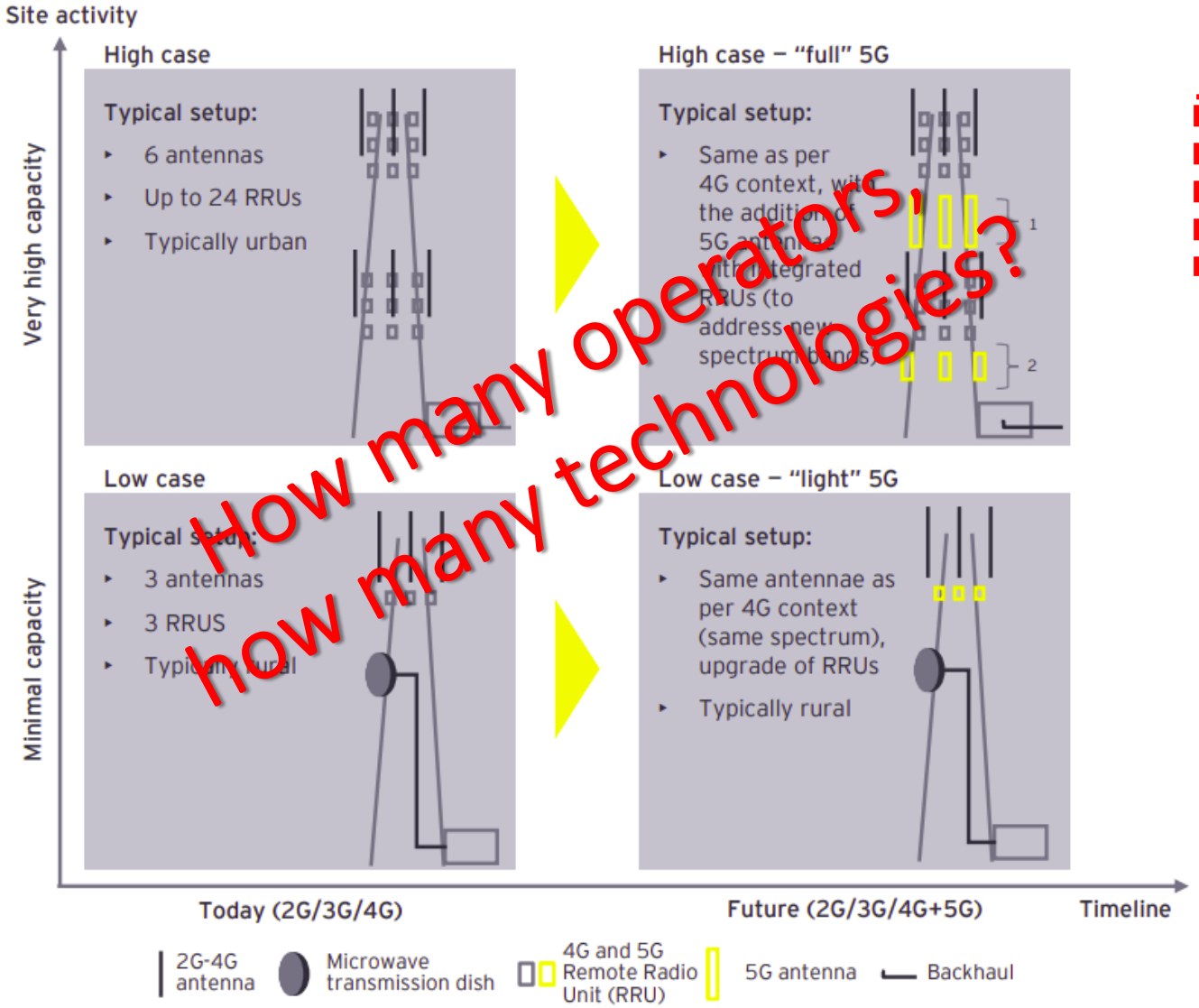
Outsourcing of wireless infrastructure to independent TowerCos is a growing trend in Europe that is in line with the model prevailing globally. It delivers a number of benefits to MNOs, the wider wireless sector and, ultimately, the consumer:

1. Independent TowerCos specialise in operating neutral host, "passive" wireless network infrastructure such as mobile towers. Sharing of towers with multiple tenants **reduces overall cost** for mobile operators, helps improve coverage and reduces consumer prices
2. Long-term international investors in European infrastructure value the benefits of the TowerCo model, resulting in an active M&A market
3. The average number of wireless network operators sharing an independent tower is **2.4**, compared to **1.3** for MNO-controlled towers. Independent TowerCos make it easier and cheaper to roll out new networks
4. A typical location of a wireless network operator (also point of presence) managed by a TowerCo is circa **40% more efficient** than one managed by an MNO, resulting in **economic savings of €31b** across Europe by 2029
5. Greater outsourcing to independent TowerCos could release an estimated **€28b of capital**, which MNOs can reinvest in their networks, such as to **improve coverage and accelerate 5G rollouts**
6. Independent TowerCos are playing a key role in **enabling 5G rollouts** and the continued expansion of **mobile network coverage**
7. While the share of independent TowerCos in Europe has increased in recent years (from 13% to **17%**), it remains low compared to other regions (e.g., 67% in USA and Canada and 42% in Latin America). A further increase in Europe would help deliver the benefits of cheaper and better mobile networks
8. The new **European Electronic Communications Code** (EECC) reflects the pro-competitive nature of independent TowerCos and is expected to benefit independent TowerCos through increased certainty for the wholesale infrastructure sector

In summary, independent TowerCos will continue to play a significant role, underpinning modern digital economies for the long-term.

EY

X-Raying Telecom Towers for "Value"…



Lease contracts vary, based on such factors as tower location and capacity, and space, weight and position on the equipment.

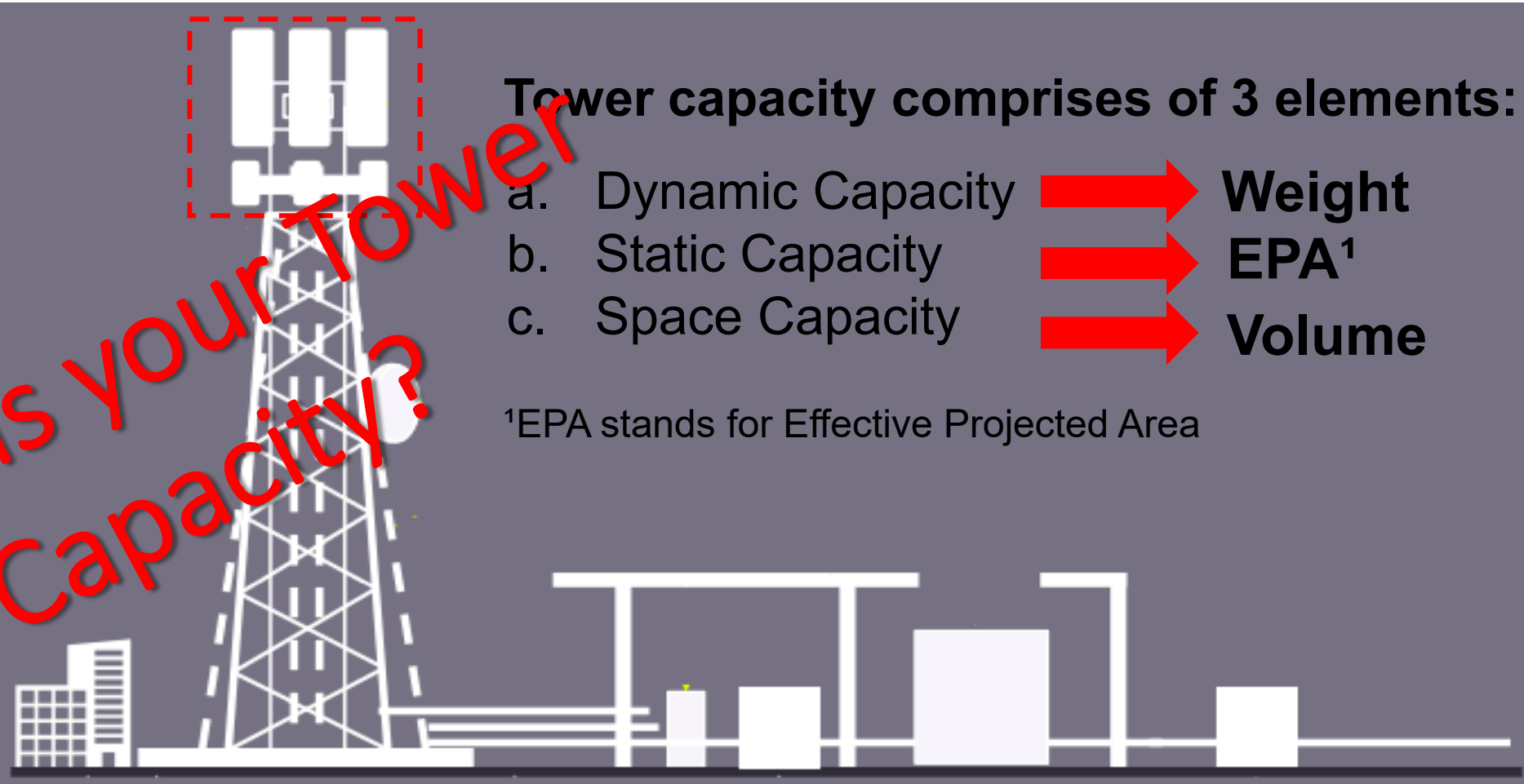
Because TowerCo's can host multiple MNO's, they have an operational edge over telecom-owned towers:

Increasing the number of tenants per site also boosts margins and returns. In fact, incremental gross margins from an additional tenant can be more than 90%.

Morgan Stanley

https://www.morganstanley.com/ideas/5G-tower-rollout-opportunities

X-Raying Telecom Towers for TowerCo's…

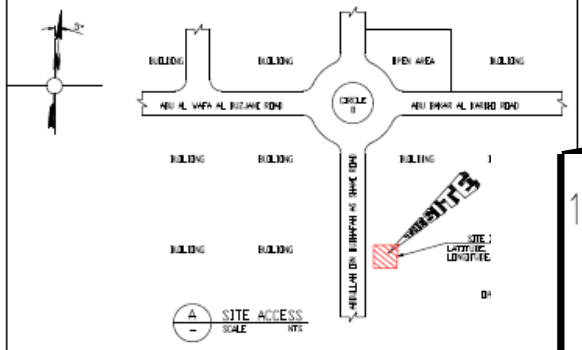


Tower capacity comprises of 3 elements:

a. Dynamic Capacity → **Weight**
b. Static Capacity → **EPA[1]**
c. Space Capacity → **Volume**

[1]EPA stands for Effective Projected Area

Serving an extra tenant on the tower-top, adding 5G technology equipment, swapping for larger – heavier antennas should be allowed from the Tower capacity!

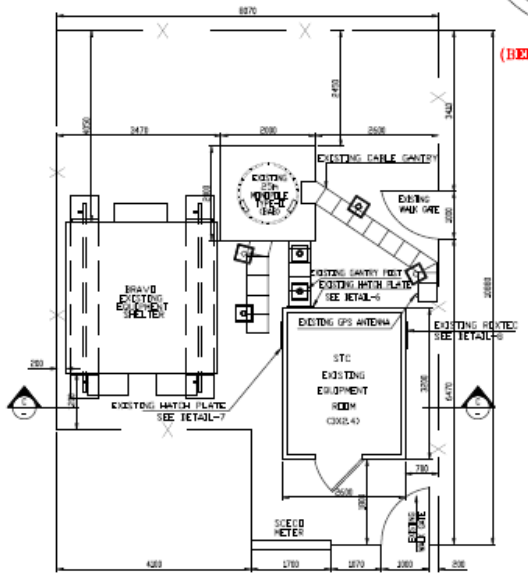


NOTES

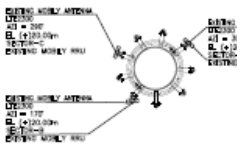
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE IN METERS.
3. MAGNETIC NORTH SHALL BE VERIFIED ON SITE BY THE CONTRACTOR PRIOR THE INSTALLATION OF ANTENNA.
4. EXISTING OCTA-BAND (8252V5-R6) FOR GSM900/UMTS900/UMTS2100/LTE1800/LTE2300/LTE700/LTE2100MHz FOR EACH SECTOR A, B & C WITH AN AZIMUTH OF 30°, 140° & 290° AT THE HEIGHT OF 25.00m SHALL BE DISMANTLE & PROPOSED NEW 30 PORT ANTENNA (AQU2240/R2WF-07) GSM900/UMTS900/LTE1800/LTE2300/LTE2100/LTE700MHz FOR SECTOR A, B & C WITH AN AZIMUTH OF 30°, 140° & 290° AT ELEVATION OF 25.00m AS PER SCO.
5. EXISTING TMA FOR LTE1800 SHALL DISMANTLE & PROPOSED NEW 3

10. ERICSSON SHALL REMOVE UNUSED/SWITCHED OFF RF CABLES & ANTENNAS FROM THE TOWER/SHELTER, REMOVED FEEDERS FROM ROXTEC SHALL BE SEALED WITH NEW MODULES. ALL REMOVED ITEMS SHALL BE RETURNED TO STC WAREHOUSE FOR FUTURE USE.

11. TOWER LOAD = BEFORE IMPLEMENTATION = 86.49% @ 35m/s
AFTER IMPLEMENTATION = 93.03% @ 35M/S



EXISTING CABLE HOLDER SECTION
SCALE 1:10



EXISTING MOBILY ANTENNA
2 PLAN VIEW @ 20.0m
SCALE 1:20

EXISTING iDEN ANTENNA
AZI=100°, EL(+)25.0M
SECTOR-A
(REAR)

NEW 30 PORT ANTENNA
GSM900/UMTS900/LTE1800/
LTE2300/LTE700/LTE2100MHz
AZI=290°,
EL(+)25.0m
SECTOR-C.
(SEE NOTE-4)

NEW RRU 4443
LTE1800/LTE2100MHz
TYP TO 3 (SEE NOTE-6)

NEW RRU 4428
LTE1800MHz
TYP TO 3 (SEE NOTE-5)

EXISTING MOBILY ANTENNA
LTE2300
AZI = 170°
EL (+)20.00m
SECTOR-B
EXISTING MOBILY RRU

EXISTING MOBILY ANTENNA
AZI=310°, EL(+)25.0m
SECTOR-C (REAR)

EXISTING iDEN ANTENNA
AZI=180°, EL(+)25.0m
SECTOR-B

EXISTING TMA GSM900/UMTS900
TYP TO 3

NEW 30 PORT ANTENNA
GSM900/UMTS900/LTE1800/
LTE2300/LTE700/LTE2100MHz
AZI=140°,
EL(+)25.0m
SECTOR-B
(SEE NOTE-4)

NEW RRU 4418
LTE2300MHz
TYP TO 3 (SEE NOTE-7)

RELOCATED RRU 2219
LTE700MHz
TYP TO 3 (SEE NOTE-8)

EXISTING MOBILY ANTENNA
AZI=140°, EL(+)25.0M
SECTOR-B (REAR)

3-DC + 3 FIBER
3-DC + 3 FIBER
3-DC + 6 FIBER
3-DC + 3 FIBER
3-DC + 3 FIBER

LIST

FEEDER TYPE
RG-8 FEEDERS
LDF-5 FEEDERS

IONS

TY OF THE SAUDI TELECOM CO. (STC).
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ASPIRATION PROJECT

2 SAUDI ARABIA

P.O.Box 107 RIYADH 11411
RIYADH KINGDOM OF SAUDI ARABIA
TEL. +966 - 462 5555
FAX. +966 - 462 0204

NT CAR CITY RIYADH
LD SITE LAYOUT
I FIELD SITE

S SHOWN | DATE 01-07-2019

RY401-ERI-Dc-0001 | REV. A | 1/2

So… will 5G roll-out impacts Tower valuation?

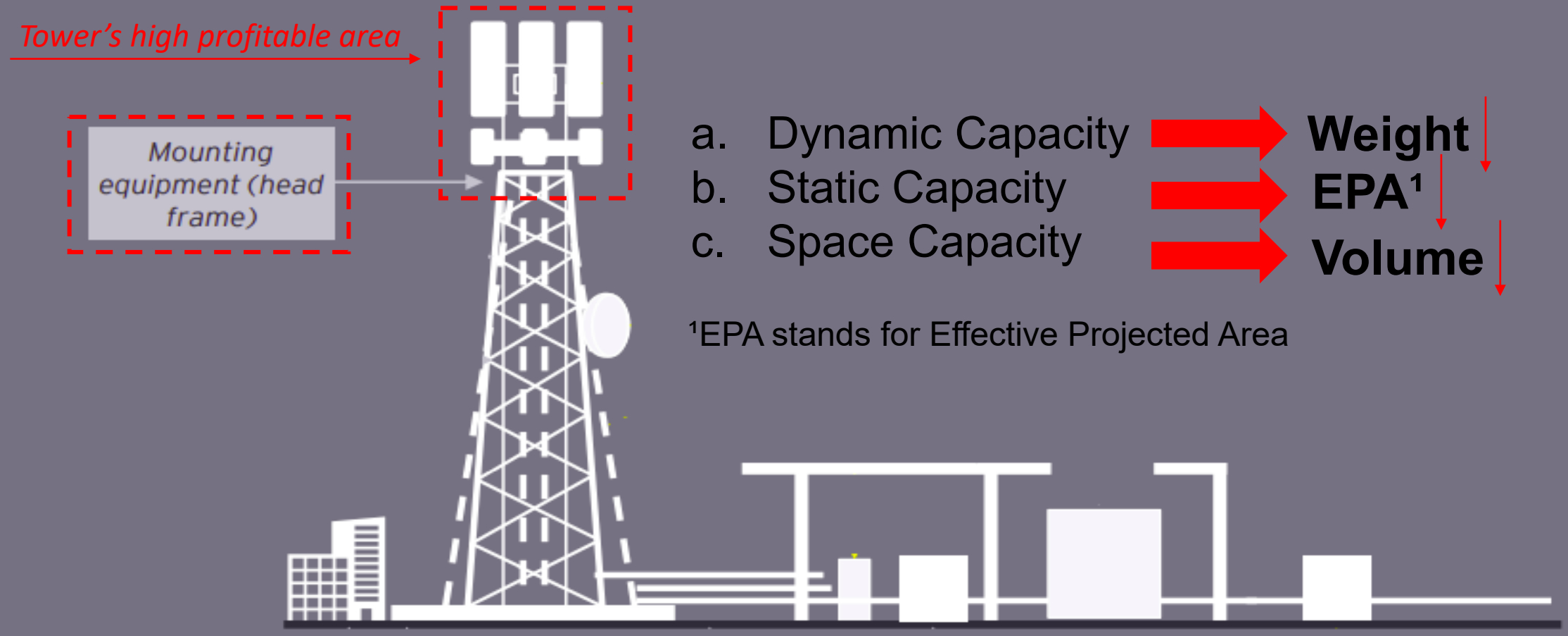
fasmetrics

Part 2: Impact of 5G on **Passive Infrastructure**

Yes!

How many Ground Towers will require static reinforcements? How many Rooftops have space for additional tenant?

Improving Ground & Rooftop Tower Capacity by…



a. Dynamic Capacity → **Weight** ↓
b. Static Capacity → **EPA[1]** ↓
c. Space Capacity → **Volume** ↓

[1]EPA stands for Effective Projected Area

On my Tower's high profitable area I need to be able to install as many antennas and equipment as possible within my tower's static and dynamic limits. To achieve that I need to optimize the tower-top installation density (i.e. Kg to m³) such that the overall tower static and dynamic efficiency not to be affected.

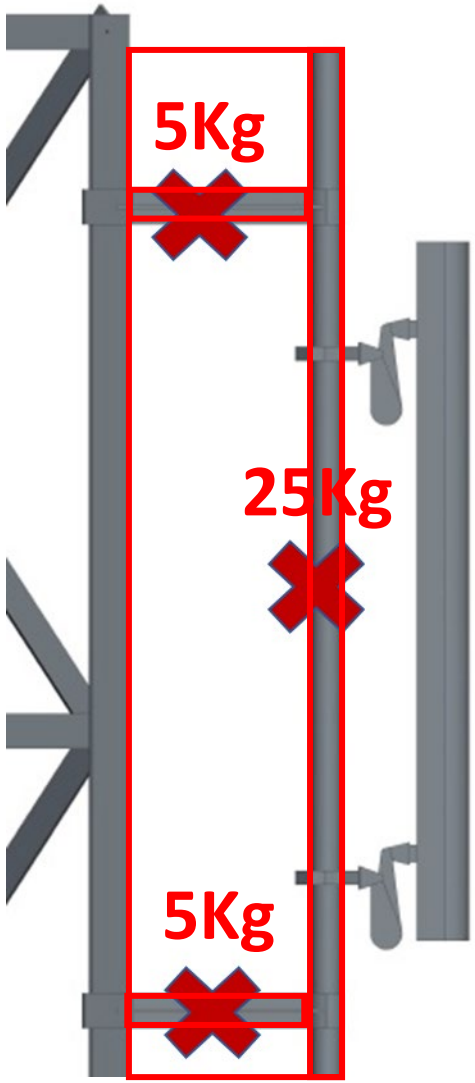
How we do it? Simply by swapping the legacy mounting!

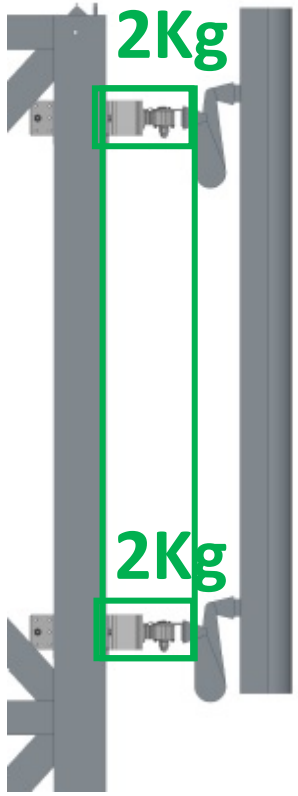
fasmetrics

A^L=0,33m² (excl. the antenna and the mechanical tilt)

W^L=40Kg (excl. the antenna and the mechanical tilt)

V^L=0,45m³ (excl. the antenna and the mechanical tilt)





A^f= 0,01m² (excl. the antenna and the mechanical tilt)

W^f= 4Kg (excl. the antenna and the mechanical tilt)

V^f= 0,06m³ (excl. the antenna and the mechanical tilt)

Case Study: E/// AIR6468 5G Antenna System

ERICSSON

MEET
AIR 6468

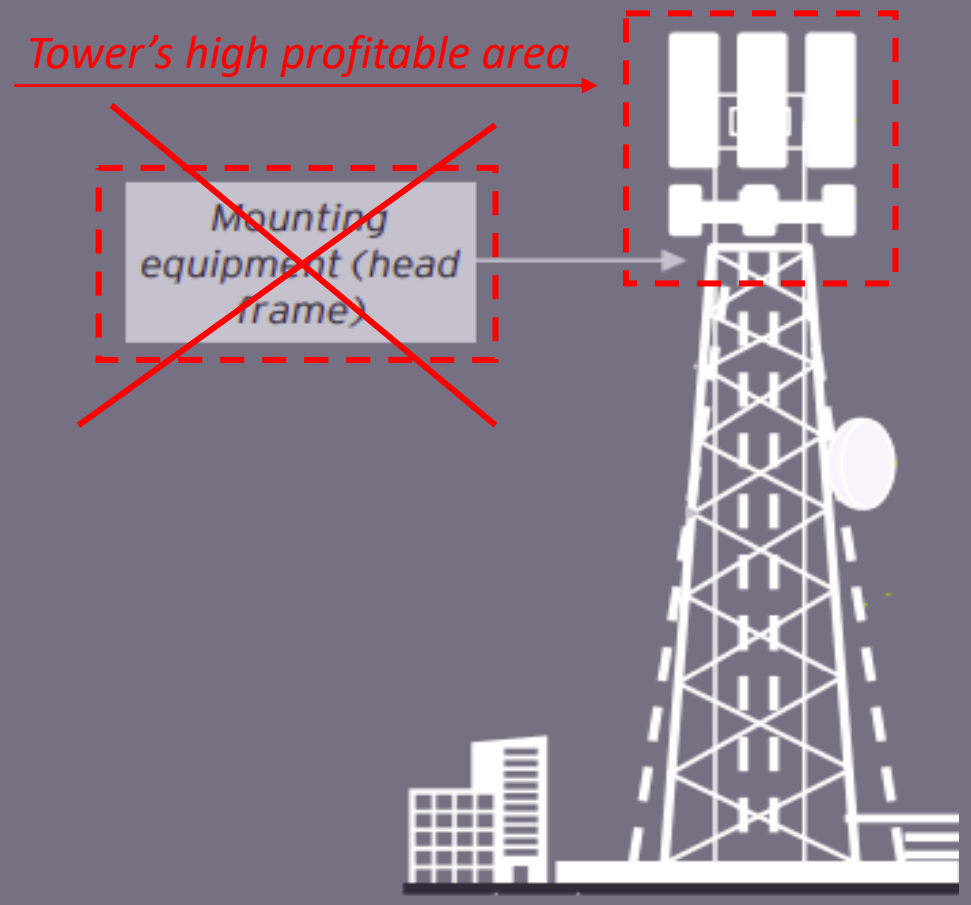
The world's first commercial 5G New Radio (NR) radio for massive MIMO and Multi-user MIMO

A= 0,19m²

W= 60Kg

V= 0,10m³

Increase capacity by swapping antenna mountings…



A^L=0,52m² (incl. the antenna and the mechanical tilt)	A^f= 0,20m² (incl. the antenna and the mechanical tilt)
W^L=100Kg (incl. the antenna and the mechanical tilt)	W^f= 64Kg (incl. the antenna and the mechanical tilt)
V^L=0,55m³ (incl. the antenna and the mechanical tilt)	V^f= 0,16m³ (incl. the antenna and the mechanical tilt)

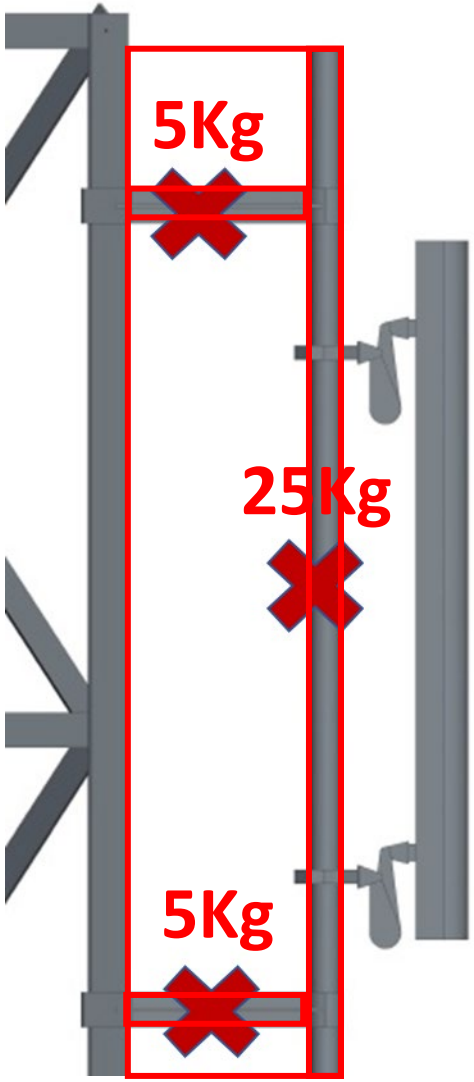
Installation density is over-doubled 2,2x (181,8Kg/m³ vs 400Kg/m³), while wind-loading is halved (0,52m² vs 0,20m²) in the tower's high profitable area. This means that for our example's AIR6468 E/// 5G antenna system our tower's high profitable area doubled it's capacity!

Legacy antenna bracket… A bad-engineering practice!

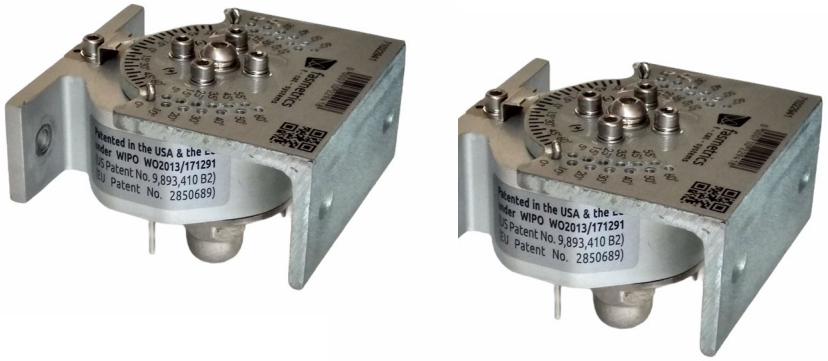
A^L=0,33m²
(excl. the antenna and the mechanical tilt)

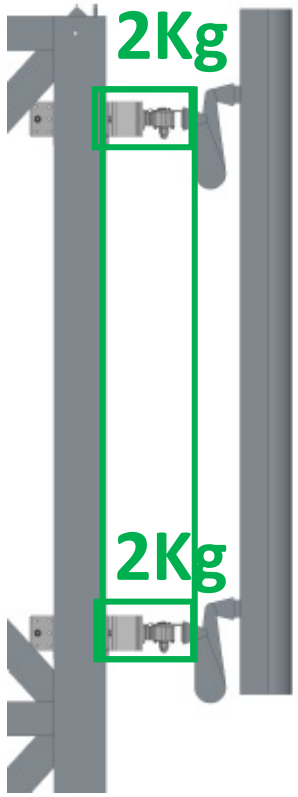
W^L=40Kg
(excl. the antenna and the mechanical tilt)

V^L=0,45m³
(excl. the antenna and the mechanical tilt)



F-CAT to the rescue… *The 5G site engineering excellence!*

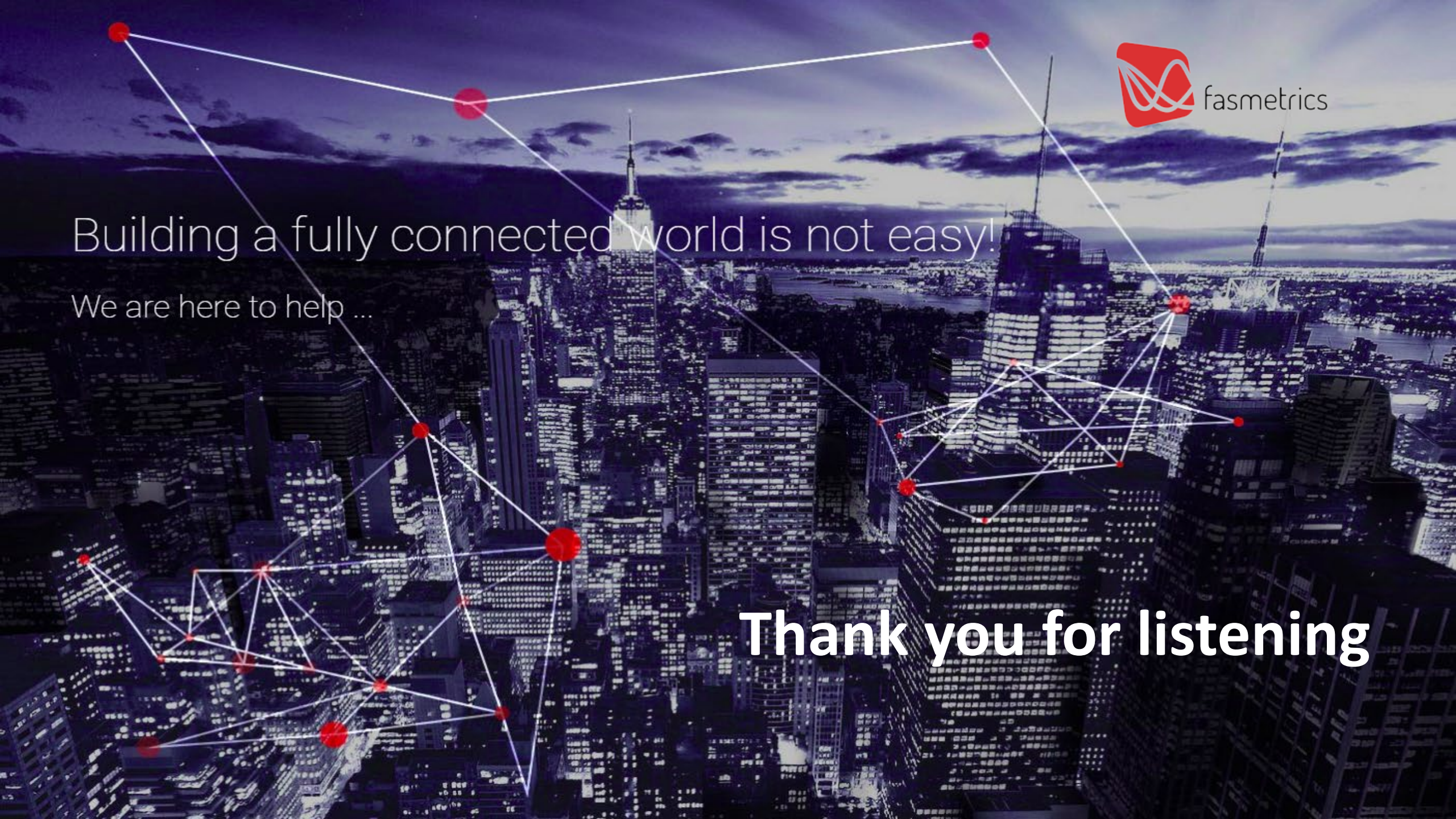




$A^f = 0{,}01m^2$
(excl. the antenna and the mechanical tilt)

$W^f = 4Kg$
(excl. the antenna and the mechanical tilt)

$V^f = 0{,}06m^3$
(excl. the antenna and the mechanical tilt)


fasmetrics
Building a fully connected world is not easy!
We are here to help ...
Thank you for listening