



**radioTM
design**

SMARTER WIRELESS

Smart Rollout to Maximise ROI

Michael Page

The **CONSIDERED** deployment of **NETWORK
INFRASTRUCTURE**

Resulting in **QUALITY NETWORKS**

That deliver the **REQUIRED PERFORMANCE**

In the most **COST EFFECTIVE** way

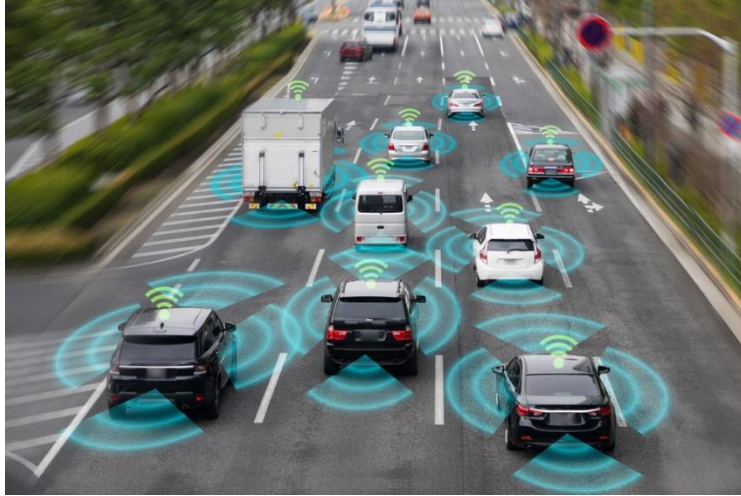


Future Network Goals

IMT-2020 USAGE SCENARIOS

Mission Critical Communications

- Ultra Reliable
- Low Latency



Enhanced Mobile Broadband

- Throughput
- Capacity

Massive Machine Communications

- Large numbers
 - Low Power
 - Low cost
- Hard to reach environments



Rural Coverage

- Coverage



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Future Network Goals

GOVERNMENTS

- DEMANDING BETTER RURAL COVERAGE
- INTRODUCING REGULATION
- SERVICE OBLIGATIONS MET BY MNOs

OFCOM REPORT 2018

- ONLY 41% RURAL PREMISES HAVE 4G COVERAGE
- ½ UK COUNTRYSIDE HAS NO 4G COVERAGE

CONFEDERATION OF BRITISH INDUSTRY (CBI) REPORT 2018

“THE UK’S DIGITAL ECONOMY COULD BE PUT AT RISK WITHOUT SIGNIFICANT ACTION TO MAKE NATIONWIDE 5G COVERAGE A REALITY BY 2027”



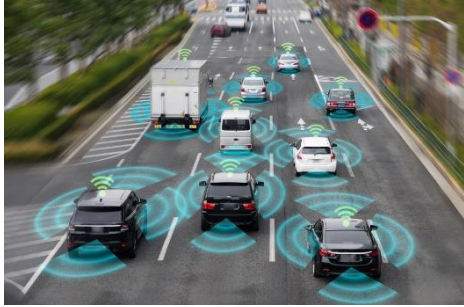
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**UBIQUITOUS 4G & 5G COVERAGE IS
VITALLY IMPORTANT TO OUR
NATIONAL ECONOMIES**



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Technical Solutions



FUTURE NETWORK GOALS - IMPLEMENTATION?



NETWORK PLANNING

- COMPLEX
- CONFLICTING

NETWORK INTEGRATION



- CHALLENGING



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Implications for Sites and Infrastructure

- More radios
- More radios/site
- More antennas
- More antennas/site
- Bigger antenna area

- 
- Site acquisition
 - New site builds
 - Increased site rental (OPEX)
 - Existing site rebuilds
 - New infrastructure
 - Infrastructure upgrades
- 



The Business Model?



ROI

Investment



Urban Business/Urban Dwellers

Suburban Business/Suburban Dwellers

Rural Business/Rural Dwellers



CAPACITY

CAPACITY/COVERAGE

COVERAGE

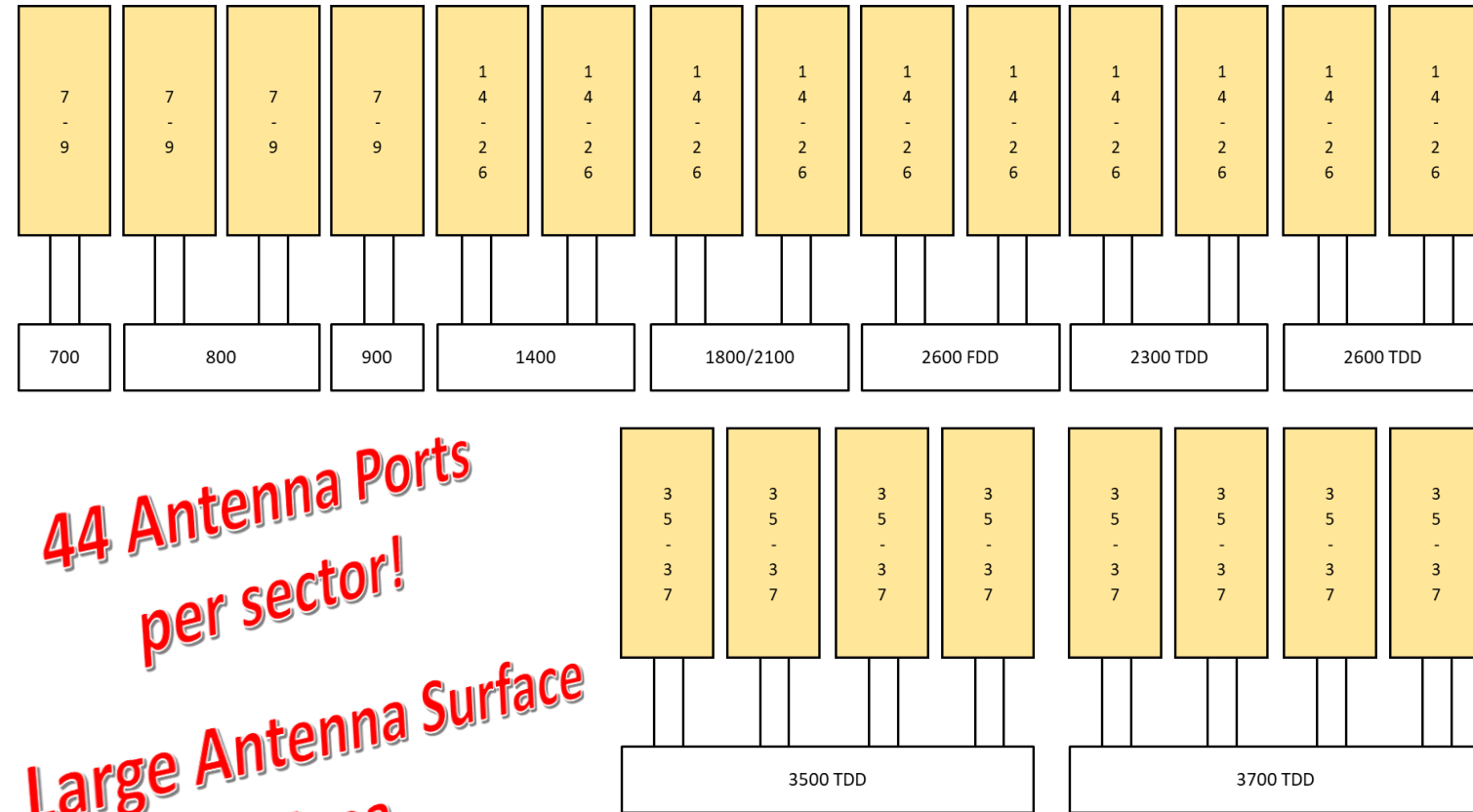
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RRU Deployment with Dedicated Antenna Ports

- 700 2x2
- 800 4x4
- 900 2x2
- 1400 4T
- 1800 4x4
- 2100 4x4
- 2300 4x4
- 2600FDD 4x4
- 2600TDD 4x4
- 3500 8x8
- 3700 8x8



Planning 🤔

Space 🤔

Weight 🤔

Wind loading 🤔

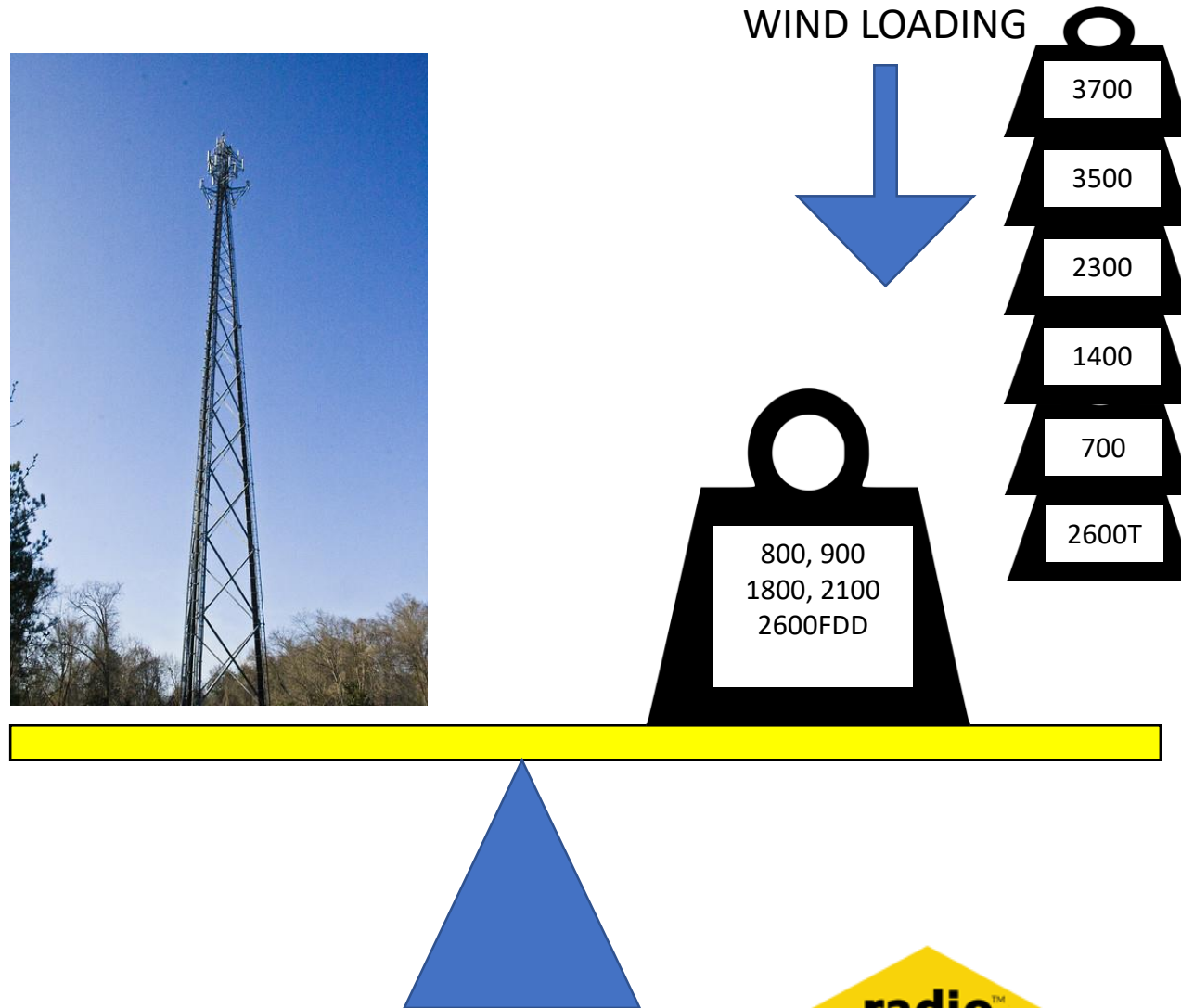
Rental (OPEX) 🤔



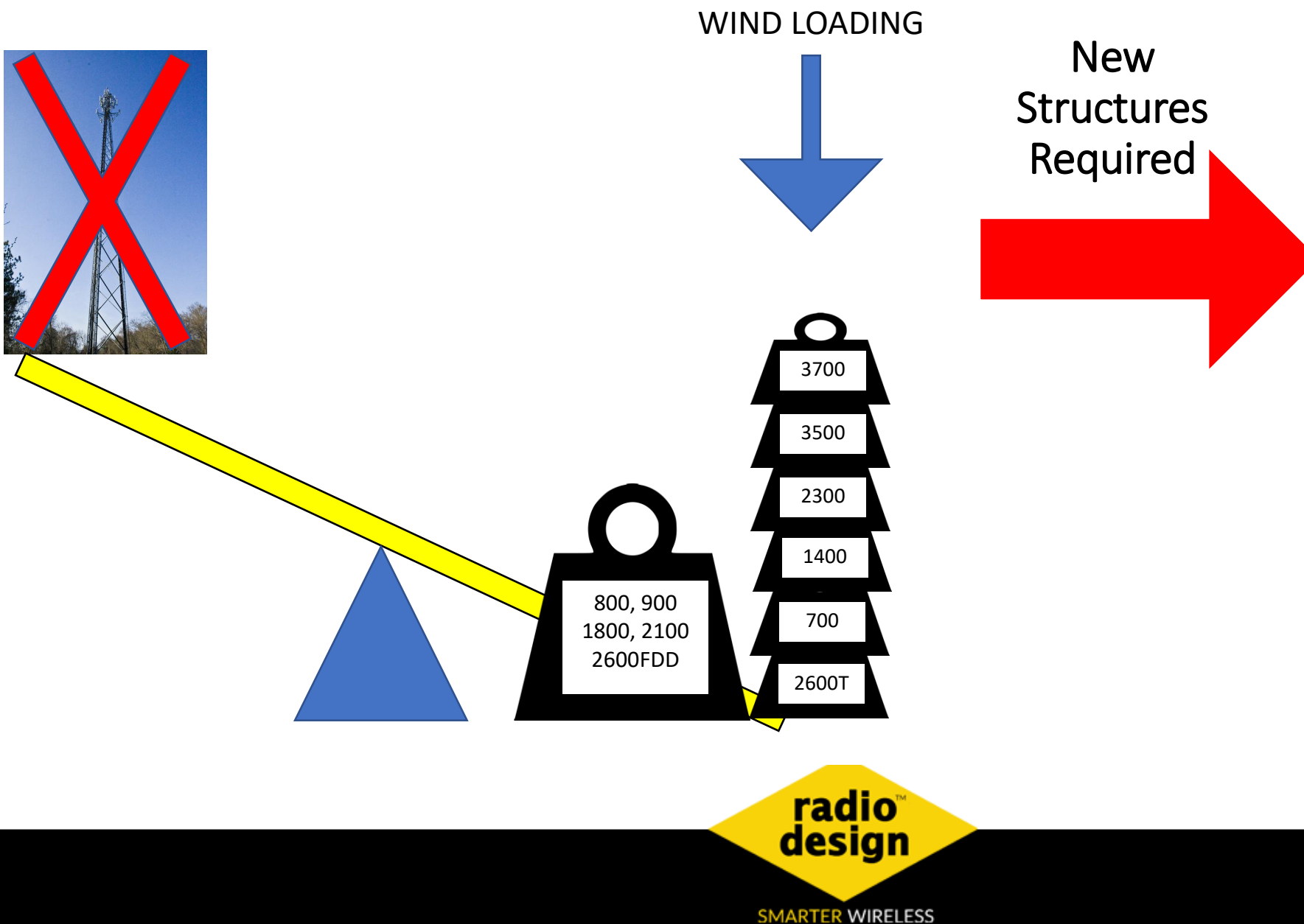
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The New Tower Tipping Point



The New Tower Tipping Point



BUT.....

With considered choice of new infrastructure

With considered re-use of existing infrastructure



The Business Model Reloaded



Investment

ROI



Urban Business/Urban Dwellers

Suburban Business/Suburban Dwellers

Rural Business/Rural Dwellers



CAPACITY

CAPACITY/COVERAGE

COVERAGE

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RRU Deployment with Shared Antenna Ports

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- 3700 8x8

Low Cost

Light

Small

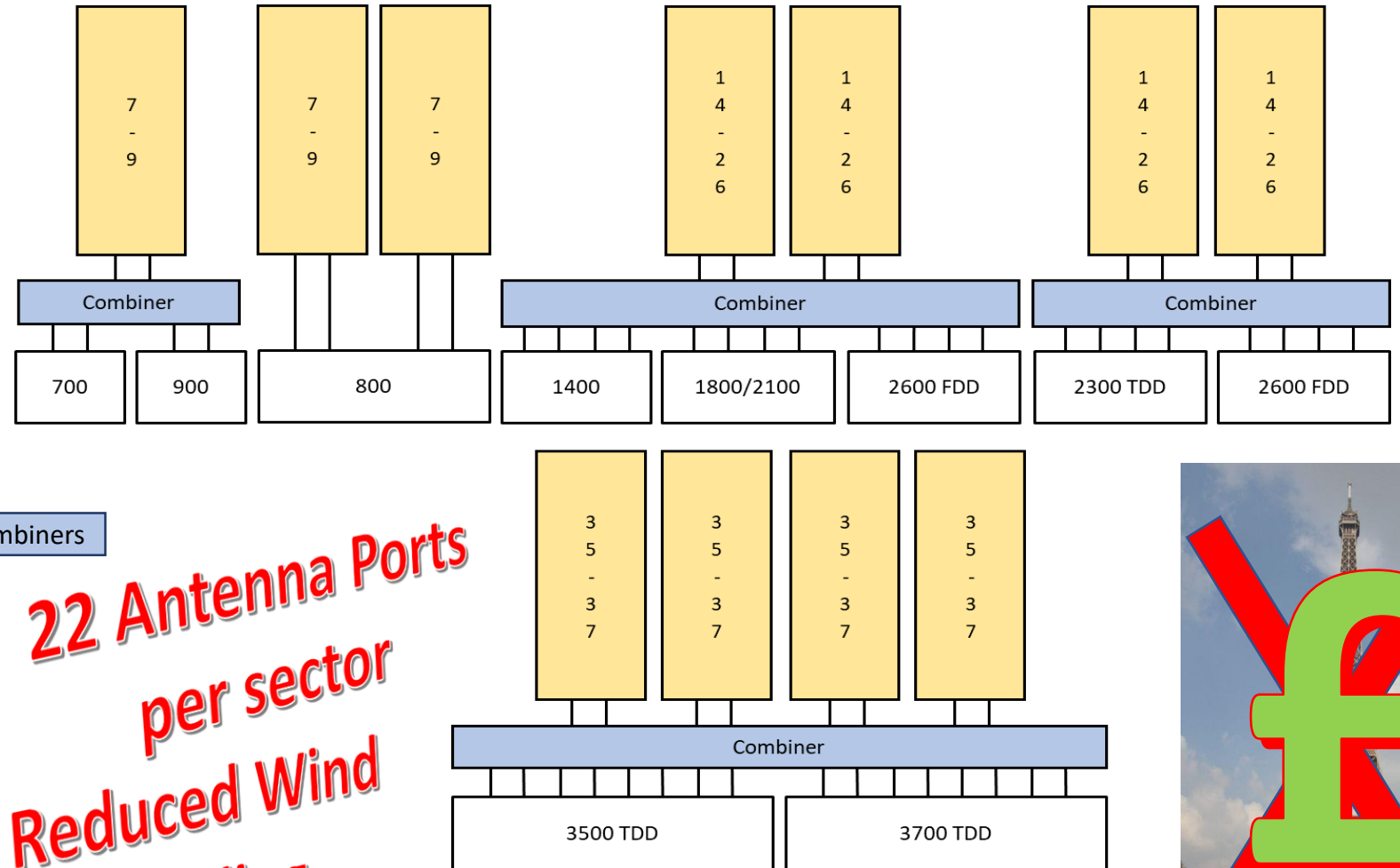
Mounted behind antennas



+

Combiners

22 Antenna Ports
per sector
Reduced Wind
Loading



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Distributed RFU/RRU Deployment with **Shared Antenna Ports**

Where there is a mix of physical RFU/RRU distances to antenna (either intended or imposed!)

INTENDED

- ESN
- EXISTING GROUND BASED BTSs

IMPOSED

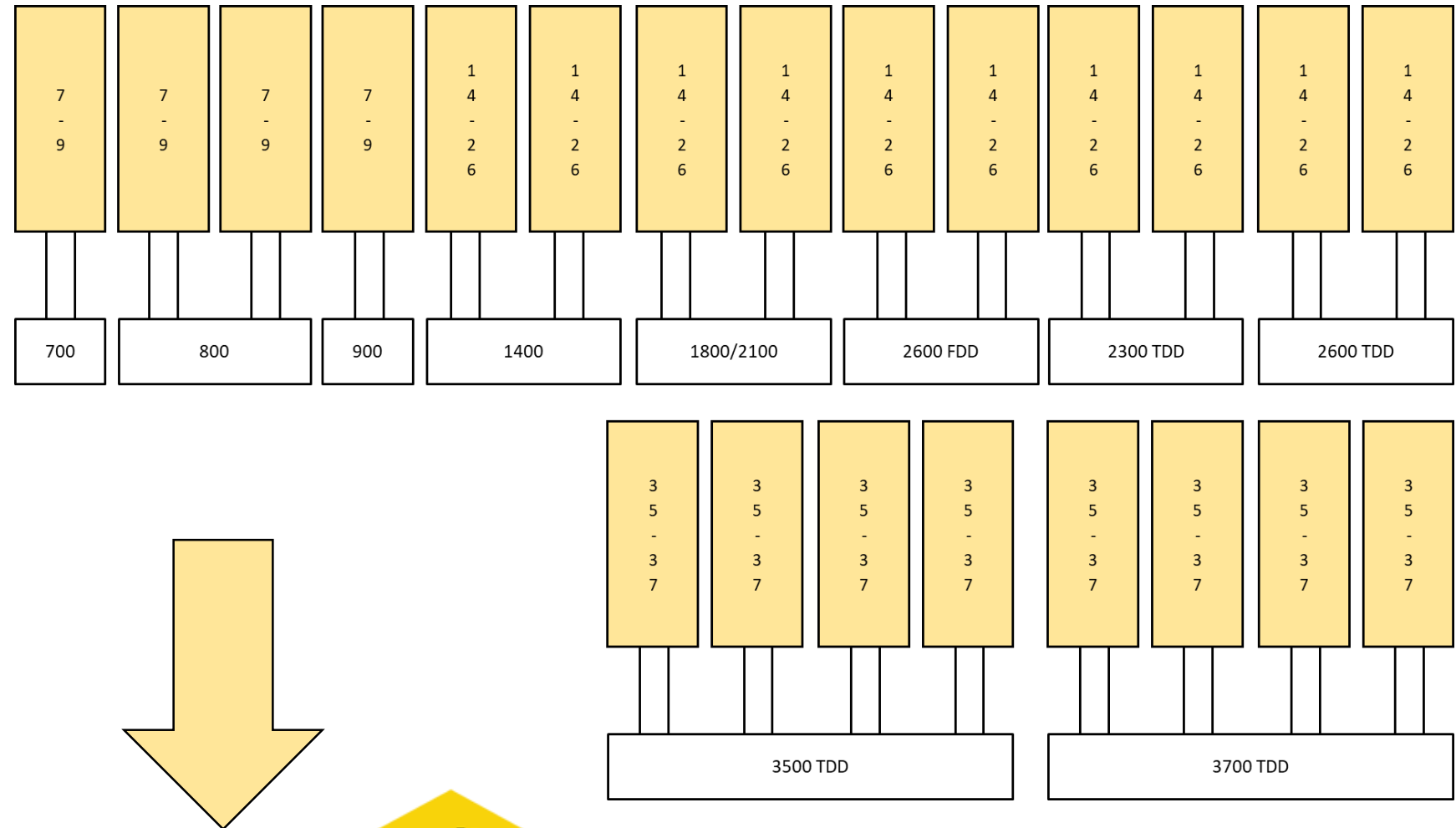
- SPACE LIMITATIONS



Distributed RFU/RRU Deployment with Shared Antenna Ports

Where there is a mix of physical RFU/RRU distances to antenna (either intended or imposed!)

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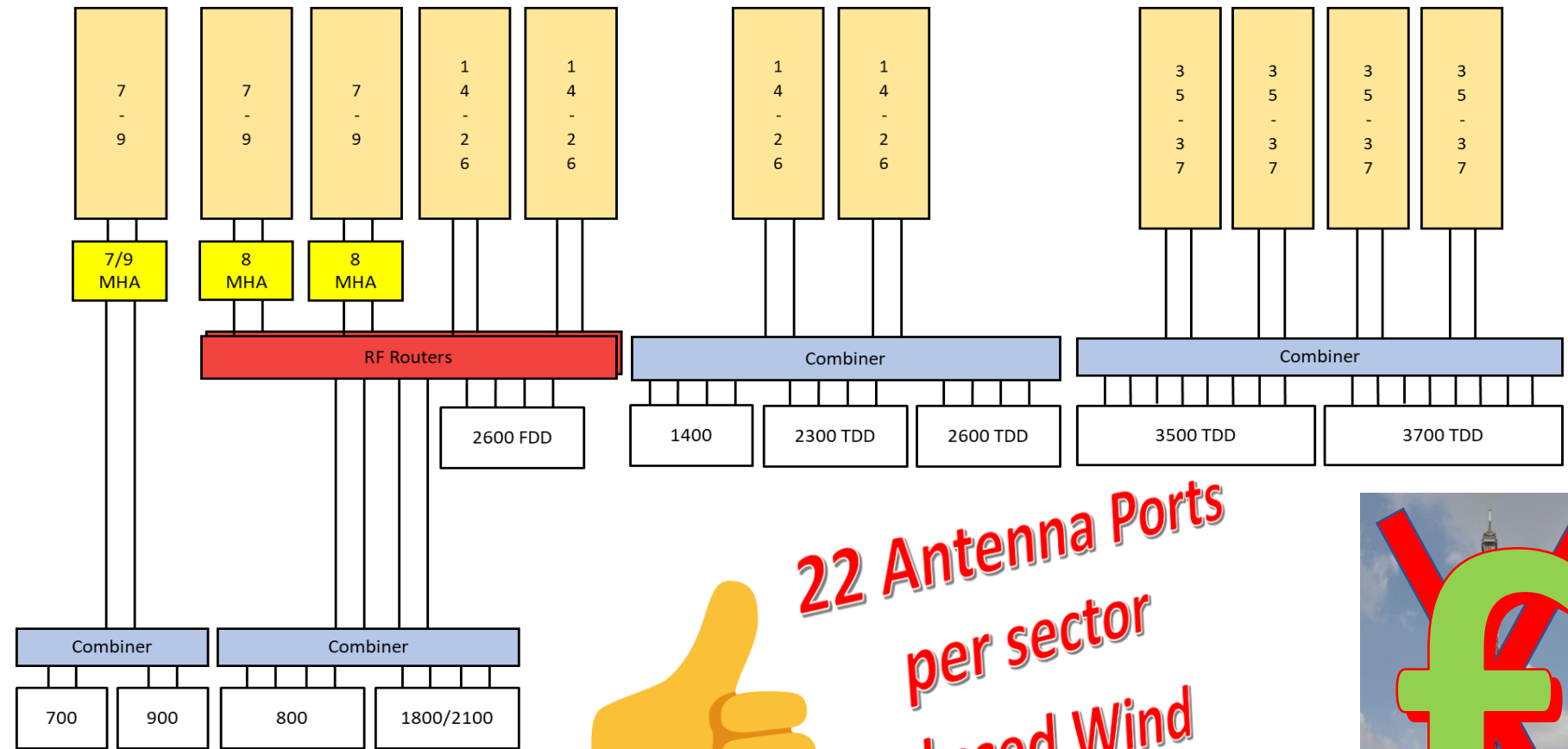
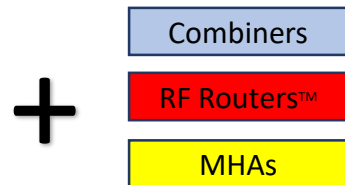
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Distributed RFU/RRU Deployment with Shared Antenna Ports

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22 Antenna Ports
per sector
Reduced Wind
Loading



Low Cost / Small / Light / Mounted behind antennas



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Distributed RFU/RRU Deployment with Shared Antenna Ports

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MHA Benefits

- Overcome uplink feeder loss
- Recover loss in system SNR due to uplink feeder loss
- Improve coverage
- Improve capacity

SO WHAT!



Low Cost / Small / Light / Mounted behind antennas

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Loading

Distributed RFU/RRU Deployment with Shared Antenna Ports

Allows Mum and Dad to stream, from their mobile, the HD video of the kids playing on the beach to Grandma and Grandad who are watching on the laptop at home

Because the MHA has facilitated a higher quality signal than would otherwise have been available at this location

MORE CAPACITY => MORE DATA => MORE REVENUE



RF ROUTER[™] Benefits

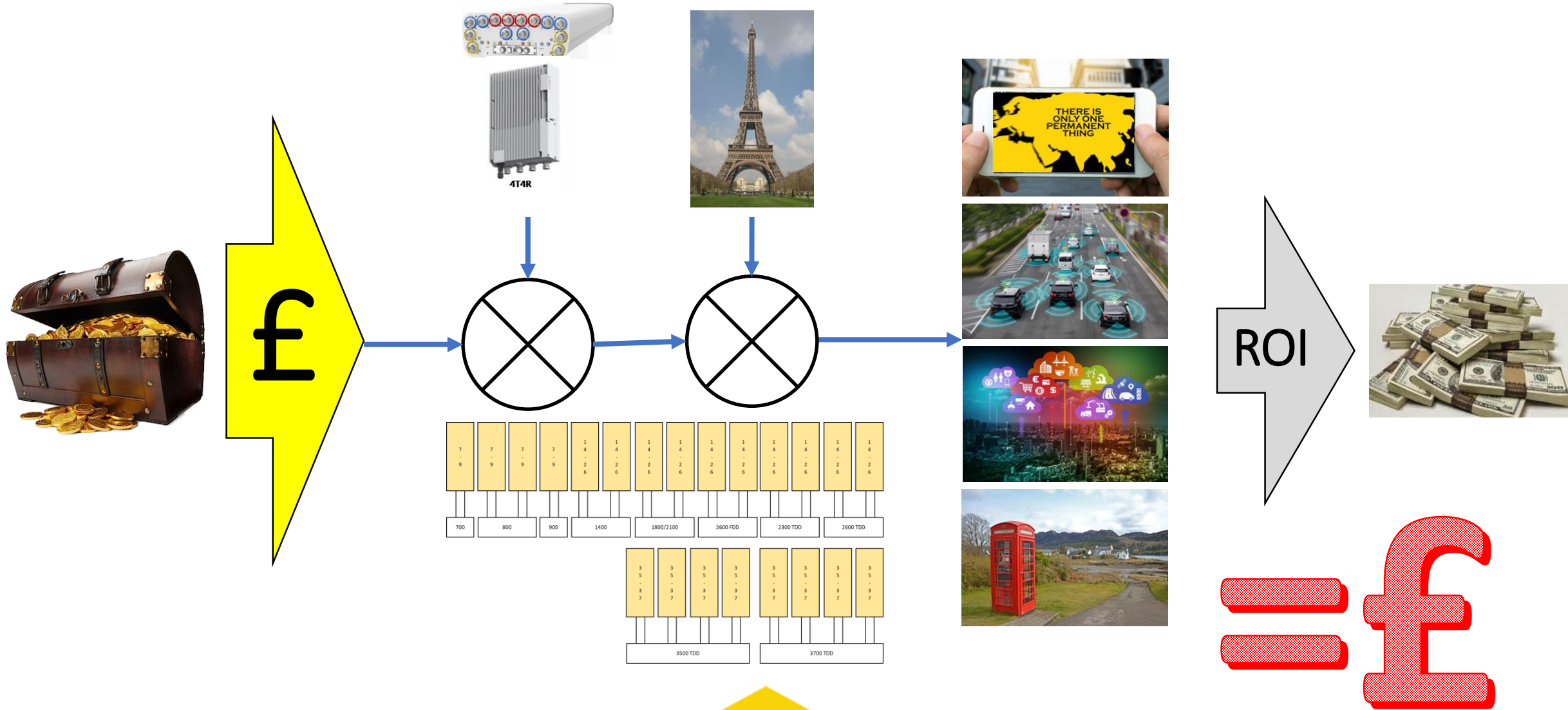
- Route multiple RF Inputs to multiple RF Outputs
- Ideal for physically separated radio units
- Performs multiple combining/splitting operations in one unit
- Minimise box count
- Minimise interconnects
- Reduce wind loading
- Passive and Active implementations
- Active RF Router[™] incorporate the benefits of MHAs

REDUCE COST (Capex & Opex)

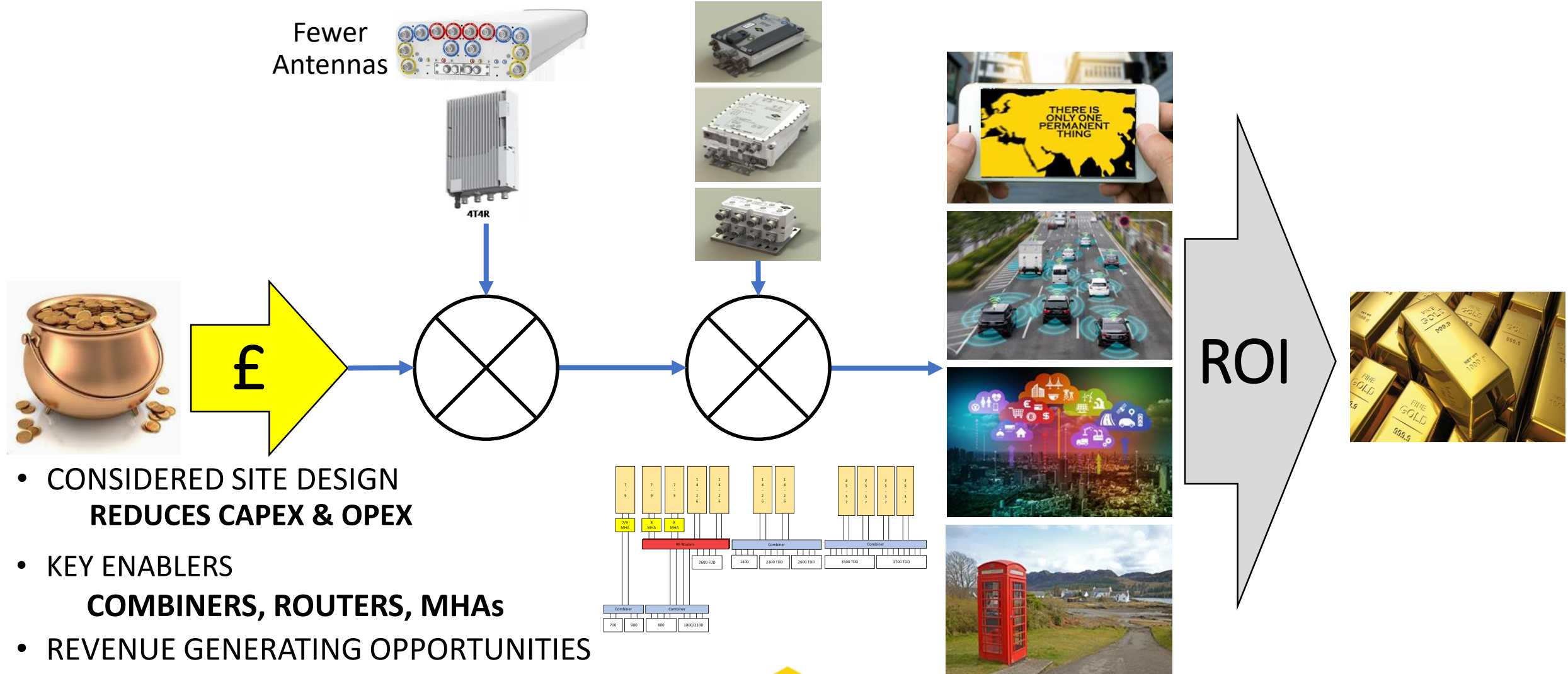


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The INFRAMAX Approach



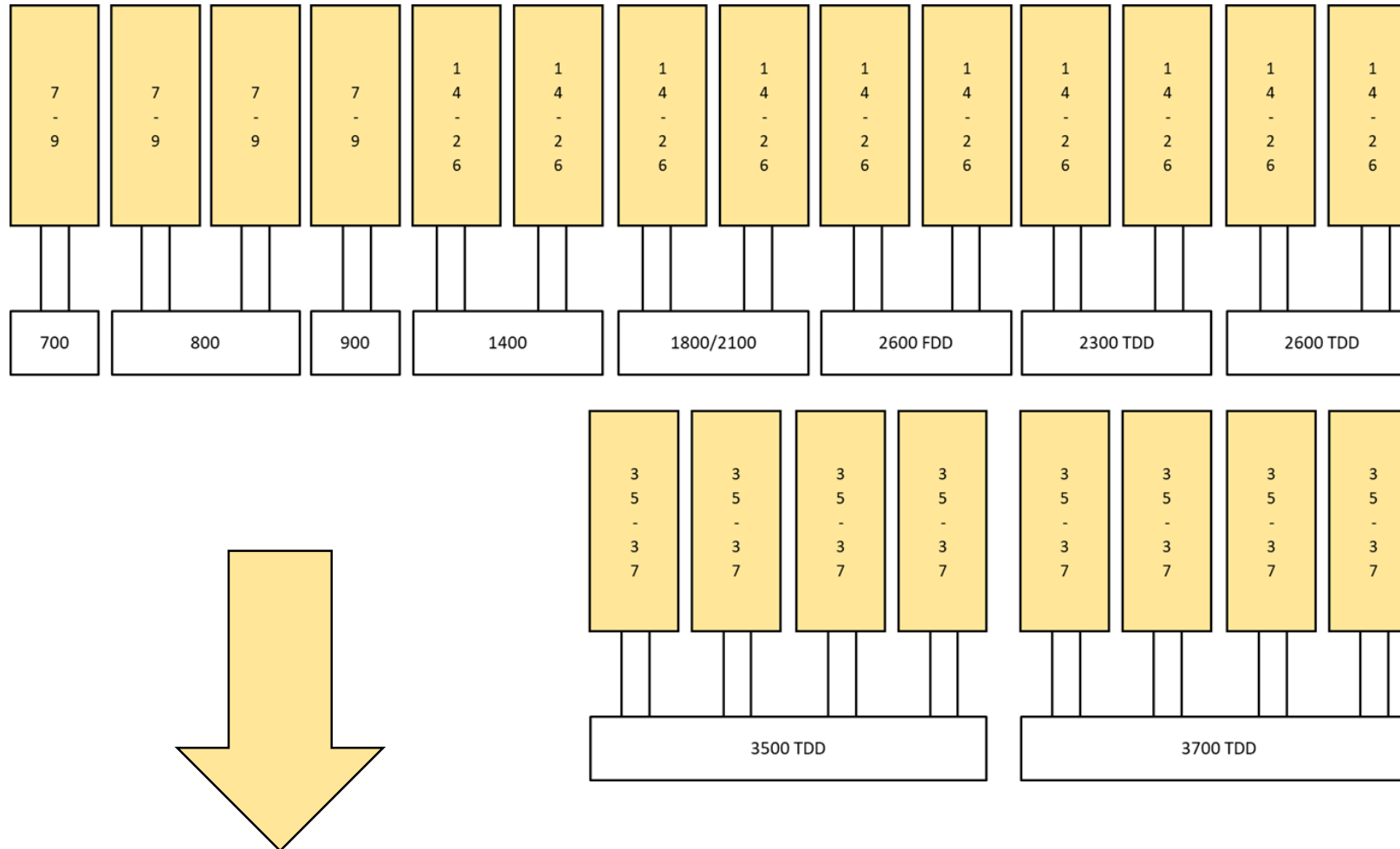
The INFAOPT Approach



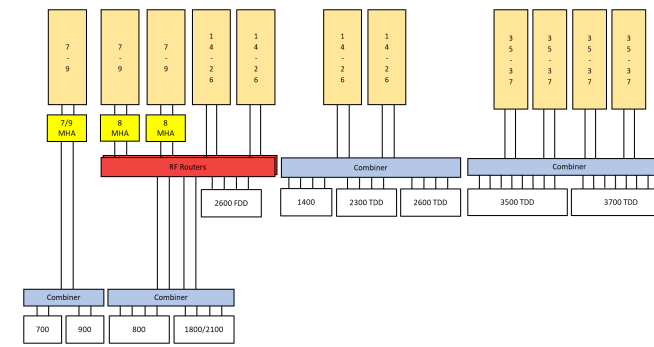
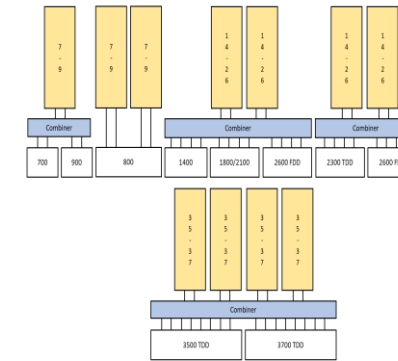
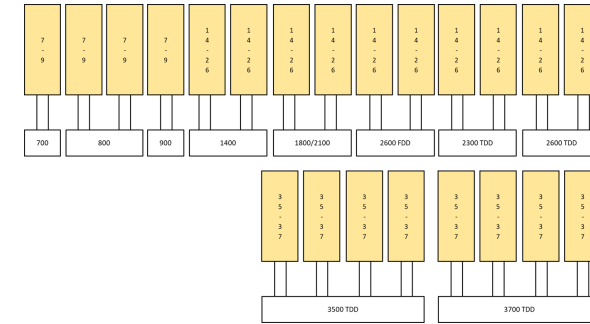
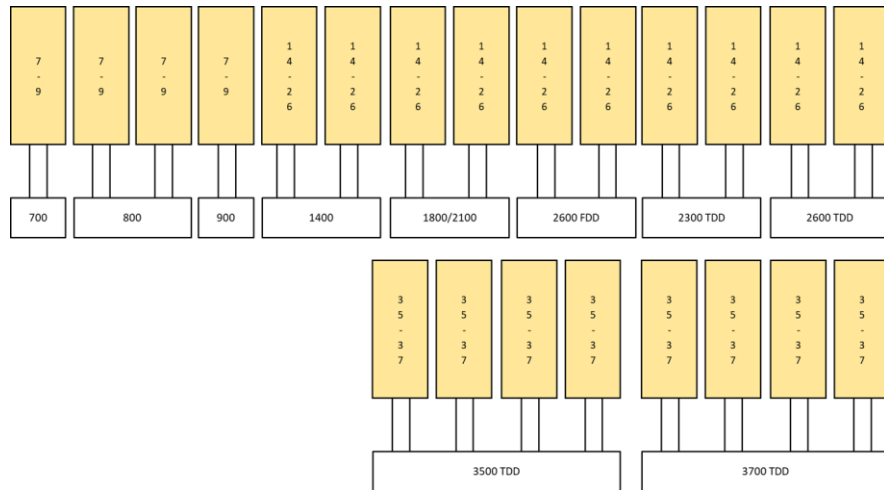
- CONSIDERED SITE DESIGN
REDUCES CAPEX & OPEX
- KEY ENABLERS
COMBINERS, ROUTERS, MHAs
- REVENUE GENERATING OPPORTUNITIES
SAME BUT WITH LOWER CAPEX & OPEX



ONE SIZE FITS ALL



ONE SIZE WON'T FIT ALL!



REAL WORLD RESTRICTIONS

- PHYSICAL
- FINANCIAL



SMART ROLLOUTS

MAXIMISE ROI



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Thank You

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The background of the image shows a busy factory floor with several workers in white lab coats and hard hats. They are working at stations with blue overhead lighting. In the foreground, there are several electronic components, likely microwave modules or antennas, mounted on a metal rack. These components have a complex internal structure with various wires and connectors. The overall scene is industrial and focused on manufacturing.

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