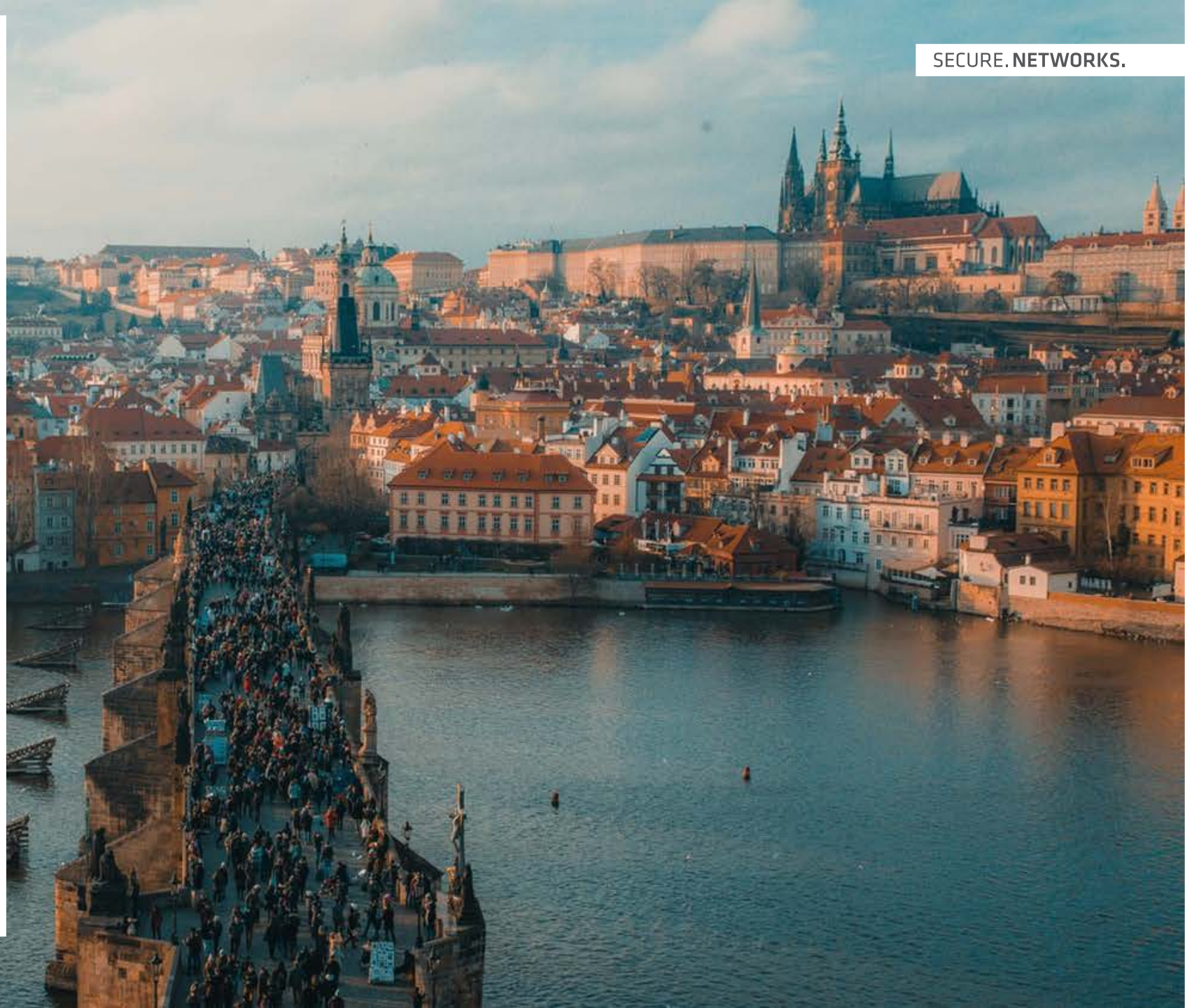

ROAD TO 6 GHZ IN EUROPE

Philipp Ebbecke (@mtroi84)

WLPC Prague 2019



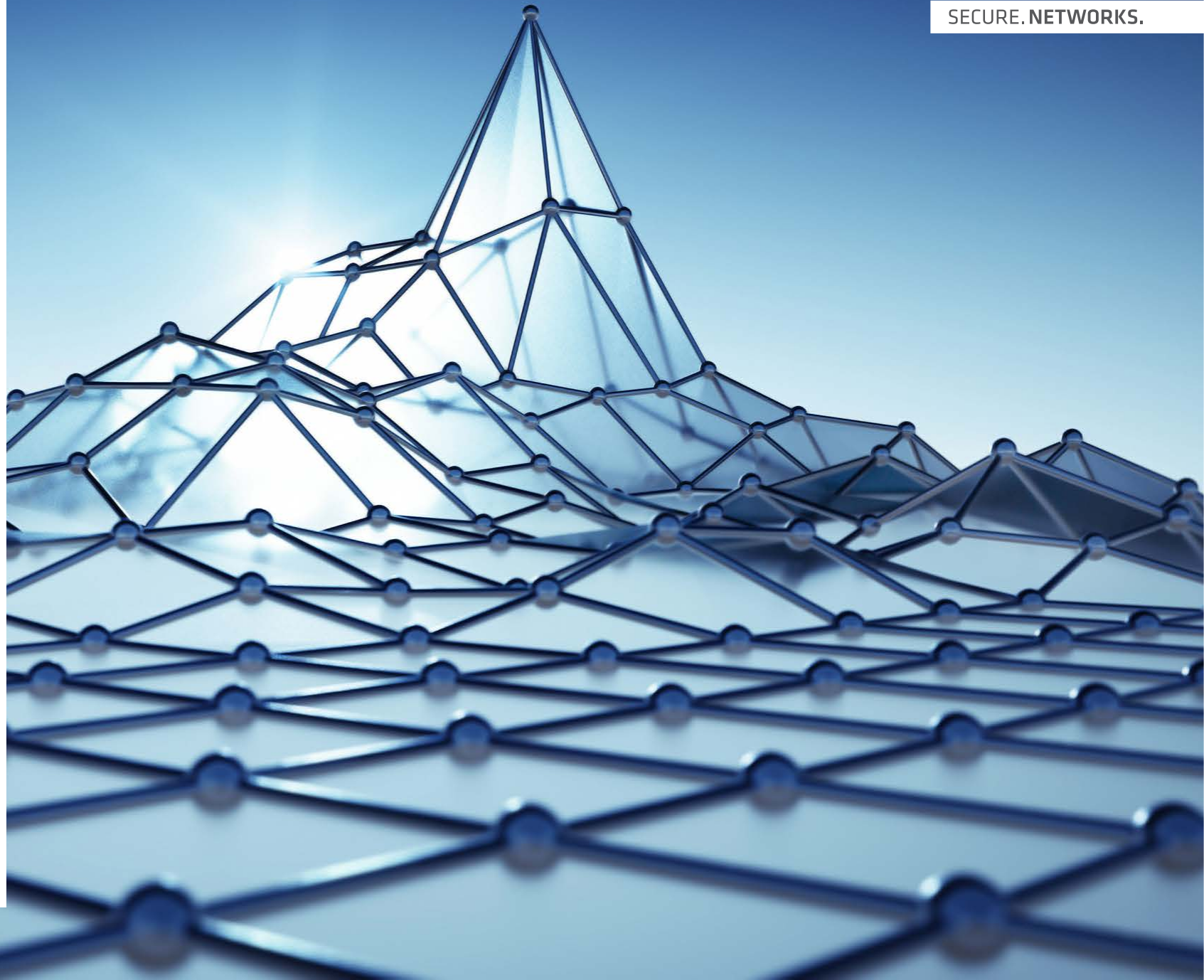
AGENDA

1. Introduction: Why do we need more spectrum?
2. The 6 GHz spectrum in Europe
3. State of the 6 GHz for Wi-Fi process
4. Conclusion and Outlook



INTRODUCTION

WHY NEW SPECTRUM



WHY NEW SPECTRUM?

WI-FI IS A GROWING BUSINESS

- Wi-Fi install base is growing year over year (~4 billion devices per year)
- Society, operators and businesses rely on Wi-Fi
- Last time new spectrum was made available for Wi-Fi: 2003
- Spectrum for mobile services has been opened up regularly for new generations (3G/4G/5G)

Value of Wi-Fi® global estimate and select markets

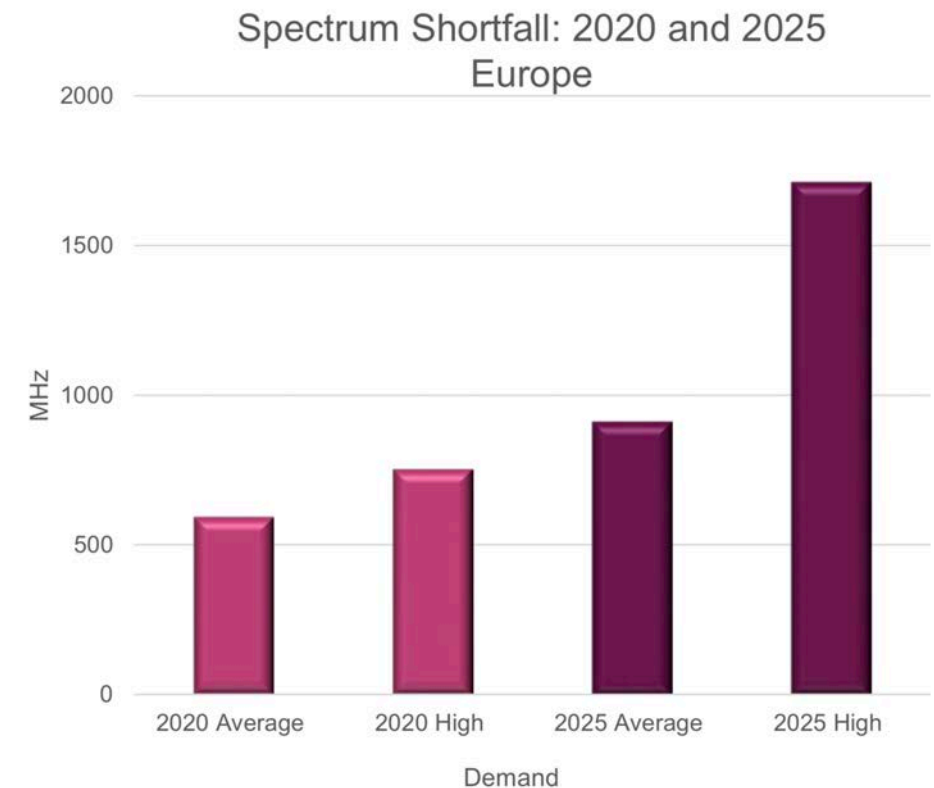


WHY NEW SPECTRUM?

NEED FOR NEW SPECTRUM EXISTS

- Politics envisions a “Gigabit Society”
- Wi-Fi requires 80 MHz channels to offer 1 Gigabit of throughput
- Only 1 DFS-free 80 MHz channel in Europe
- 4 x 80 MHz channels in Europe in total
- Enterprise Wi-Fi runs 20 or 40 MHz channels due to spectrum shortfall and device restrictions

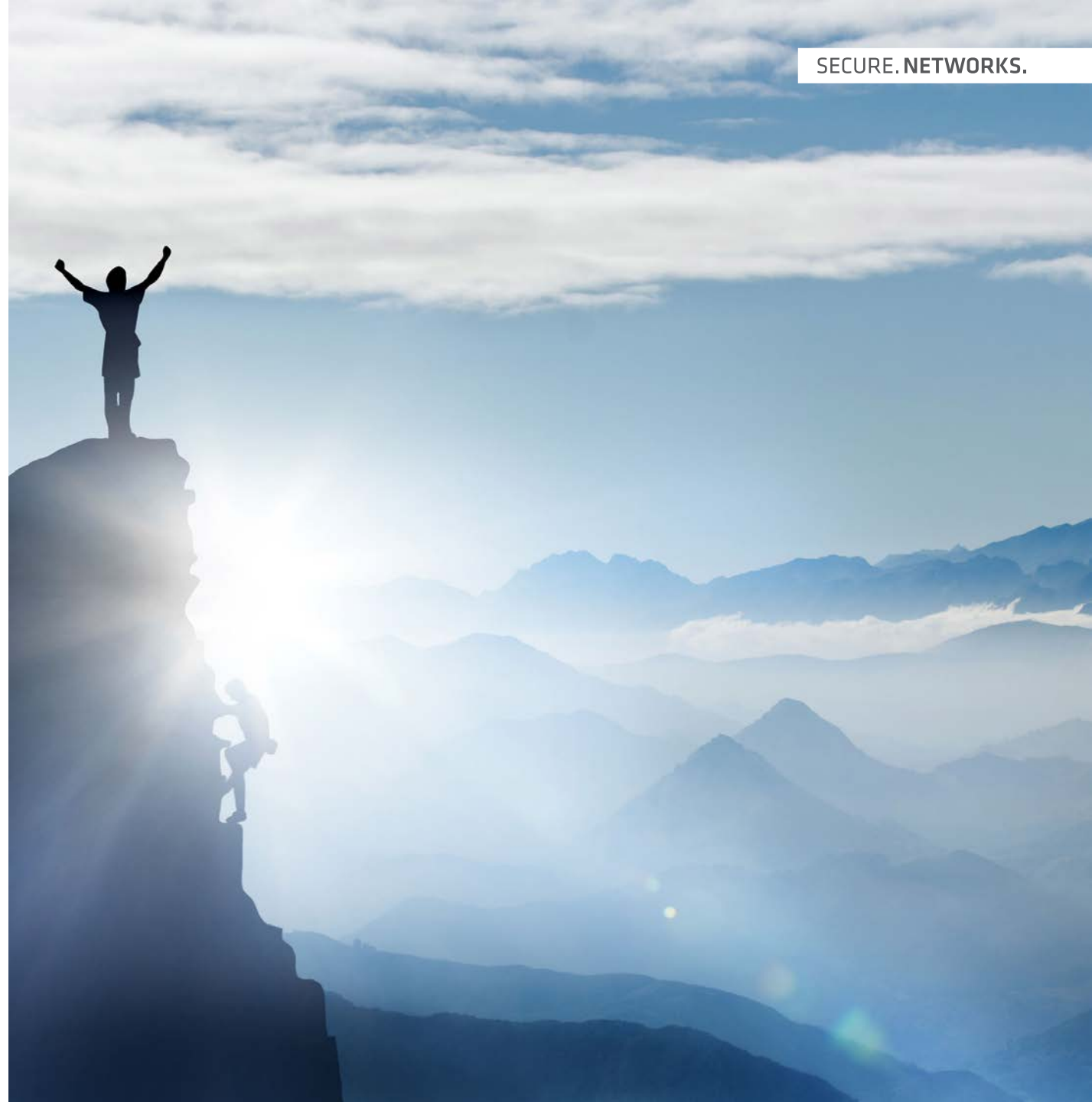
Wi-Fi Alliance Spectrum Needs Study (Feb. 2017)



WHY 6 GHZ?

PERFECT FIT FOR WLAN

- Good propagation, "long" range is possible
- Does allow high performance
- Easy to extend current products to 6 GHz
- Propagation considered "similar to 5 GHz"
- Good potential for global harmonization



WHY 6 GHZ?

HOW TO GET NEW SPECTRUM?

- International Telecommunication Union (ITU) assigns specific services to frequency bands
- World Radiocommunication Conference (WRC) every 4 years
- 6 GHz band has co-primary(!) “mobile allocation” along other primary and secondary services
- Co-primary means: Existing systems in the band need to be protected from “harmful” interference



6 GHZ SPECTRUM IN EUROPE



EU, EUROPE AND OTHERS

WHAT IS CEPT?

- › European Commission mandated CEPT to investigate spectrum between 5,925 to 6,425 MHz
- › CEPT: Conférence Européenne des Administrations des Postes et des Télécommunications
- › EU has 28 members, CEPT has 48 members
- › CEPT includes countries like:
 - Switzerland
 - Vatican
 - Turkey
 - Russian Federation



EU, EUROPE AND OTHERS

ONLY LOWER PART OF 6 GHZ

- USA/FCC investigates spectrum from 5,925 to 7,125 MHz vs. Europe/CEPT only 5,925 to 6,425 (1200 vs. 500 MHz)
- Reason: European countries have critical services in upper part of the 6 GHz band
- Idea is to show Wi-Fi can enter the lower part and then investigate the upper part



LANCOM

Systems

SECURE. NETWORKS.

6 GHZ SPECTRUM INCUMBENTS



FIXED SERVICES

POINT TO POINT

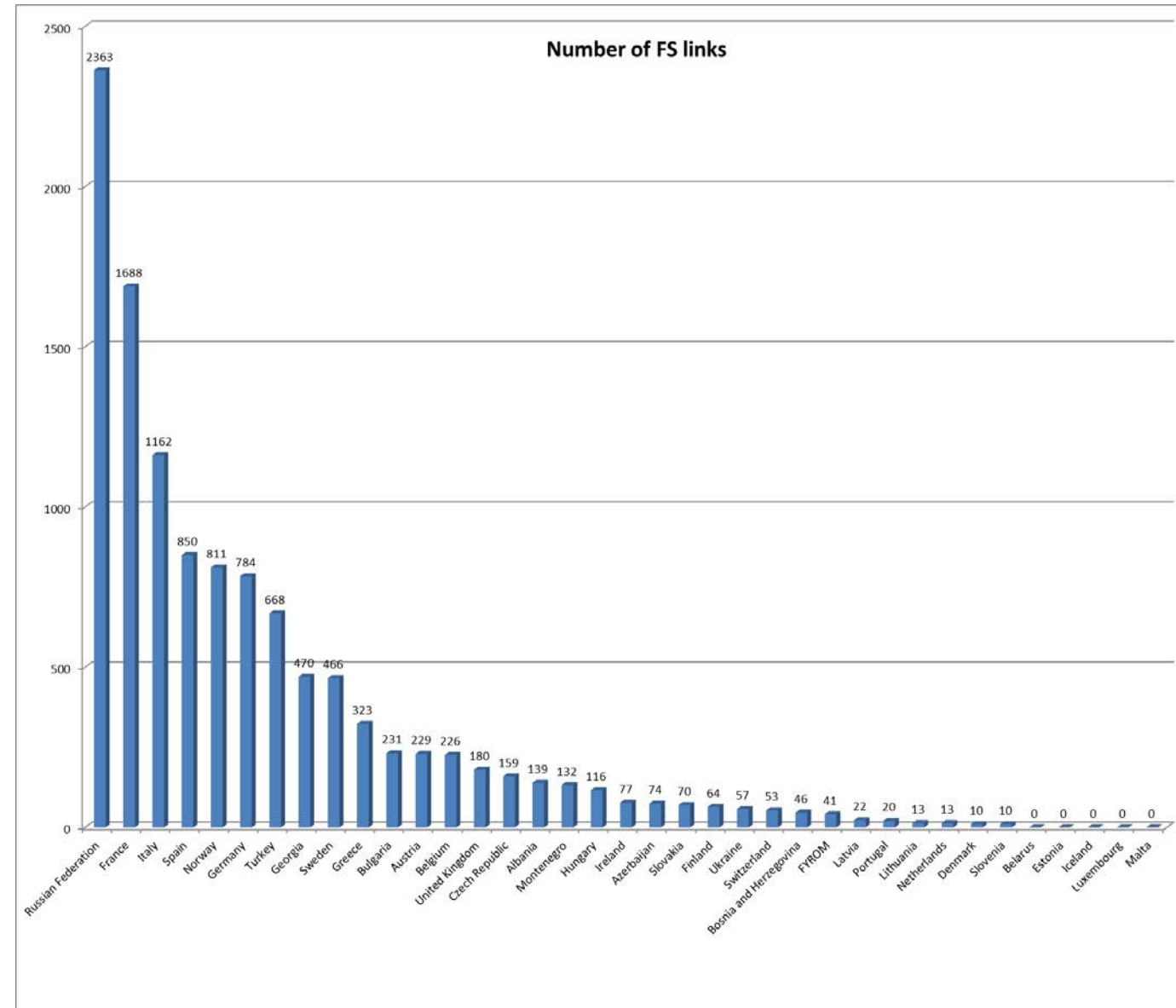
- Very important service
- Guaranteed QoS for the customers
- Relocation is very difficult
- European countries have varying amount of fixed links



FIXED SERVICES

POINT TO POINT

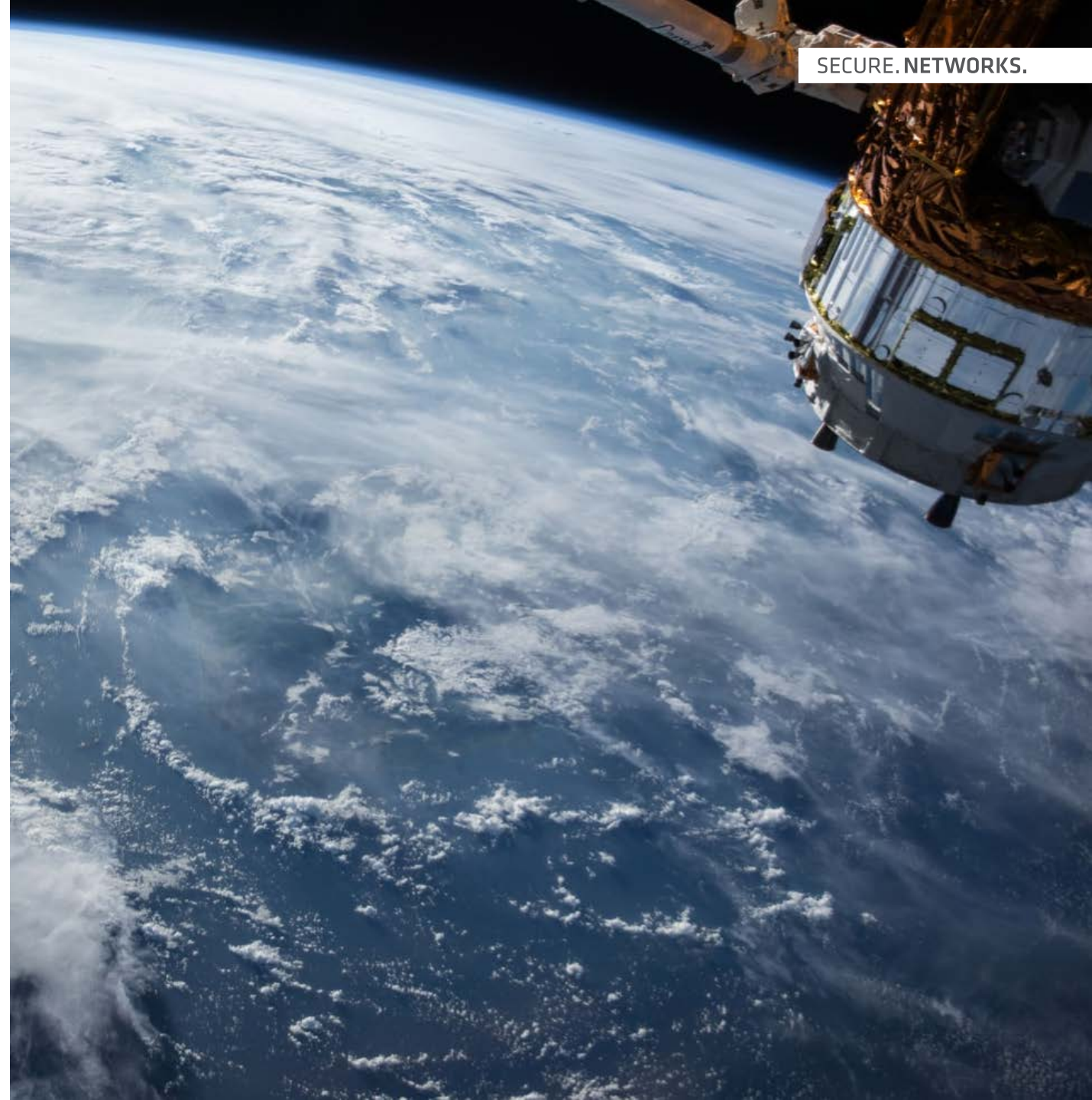
- Very important service
- Guaranteed QoS for the customers
- Relocation is very difficult
- European countries have varying amount of fixed links



FIXED SATELLITE SERVICES

EARTH TO SPACE COMMUNICATION

- Equipment operates for multiple years
- Relocation/Replacement nearly impossible
- Covering a large area
- Especially sensitive to outdoor Wi-Fi deployments



ROAD INTELLIGENT TRAFFIC SYSTEMS AND COMMUNICATION BASED TRAIN CONTROL (CBTC)

AUTONOMOUS TRAINS

- For example: Metro lines in Paris and Copenhagen
- Communication is key for a secure & safe operation
- Reaches into lower 6 GHz band (< 5,936 MHz)
- Only a few deployments so far....
- ... but CBTC aims for a harmonized band across CEPT as well



RADIO ASTRONOMY

LOOKING FOR MATTER IN SPACE

- Only a few sites (~19) in Europe
- Example: Observations of methanol in space (6,650-6,675.2 MHz)
- Rather a national than an European issue

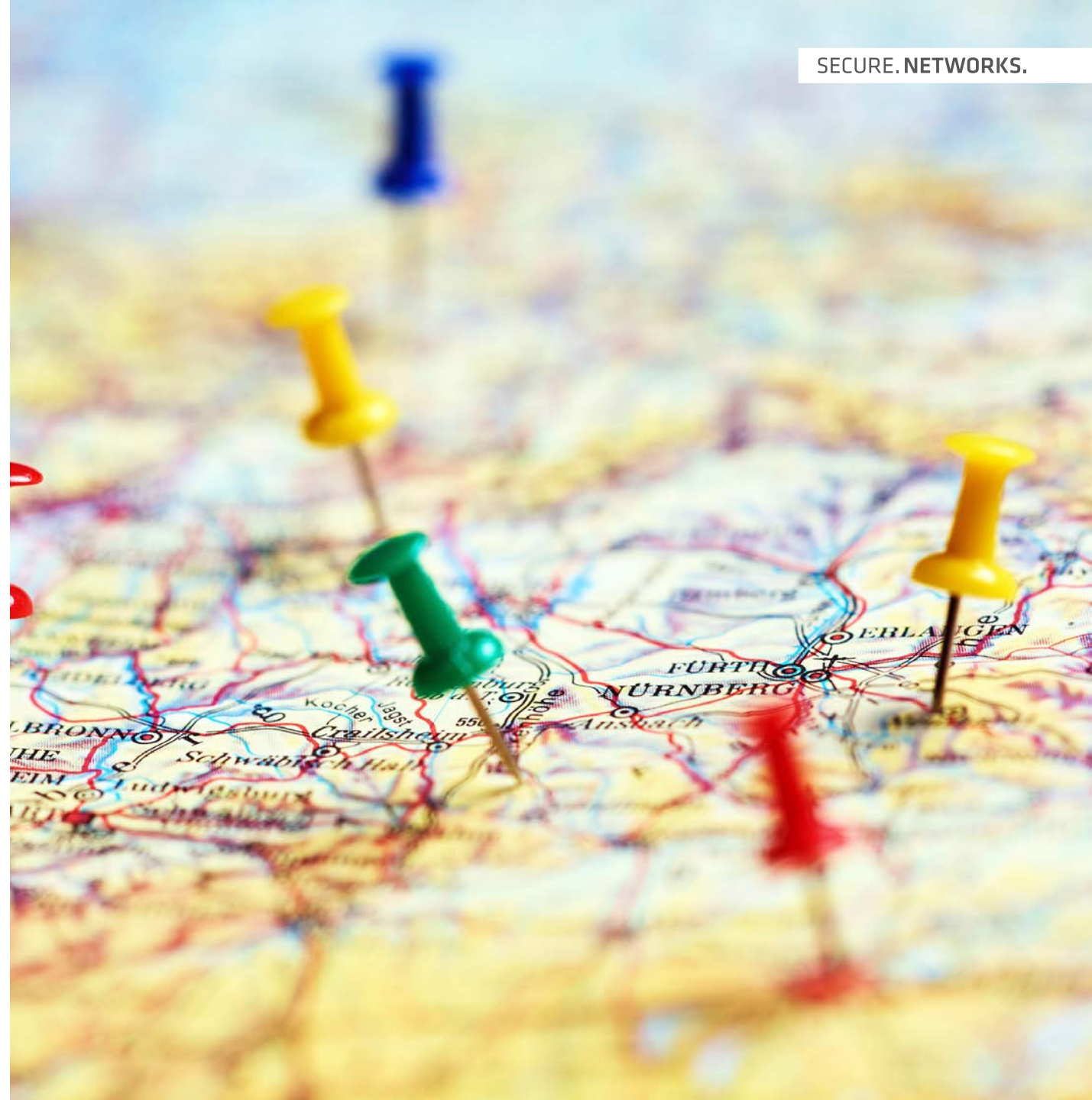


ULTRA WIDEBAND (UWB)

A USER WITH NO RIGHTS

- Mainly sensor/ranging applications
- UWB can use 6 GHz band...
- ...but needs to protect all other incumbents and not vice versa(!)

=> UWB has no right to be protected



6 GHZ SPECTRUM

STATE OF PROCESS



CEPT TERMINOLOGY

SE, FM AND ECC

- Spectrum Engineering (SE): Technical studies about coexistence -> Create an "Electronic Communications Committee" (ECC) report
- Frequency Management (FM): Design regulatory and technical rules to allow operation -> Create CEPT report(s)
- SE45 creates ECC report and FM57 creates 2 CEPT reports called "A" and "B" for Wi-Fi in 6



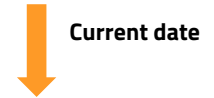
EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE (ETSI)

INDUSTRY STANDARDS

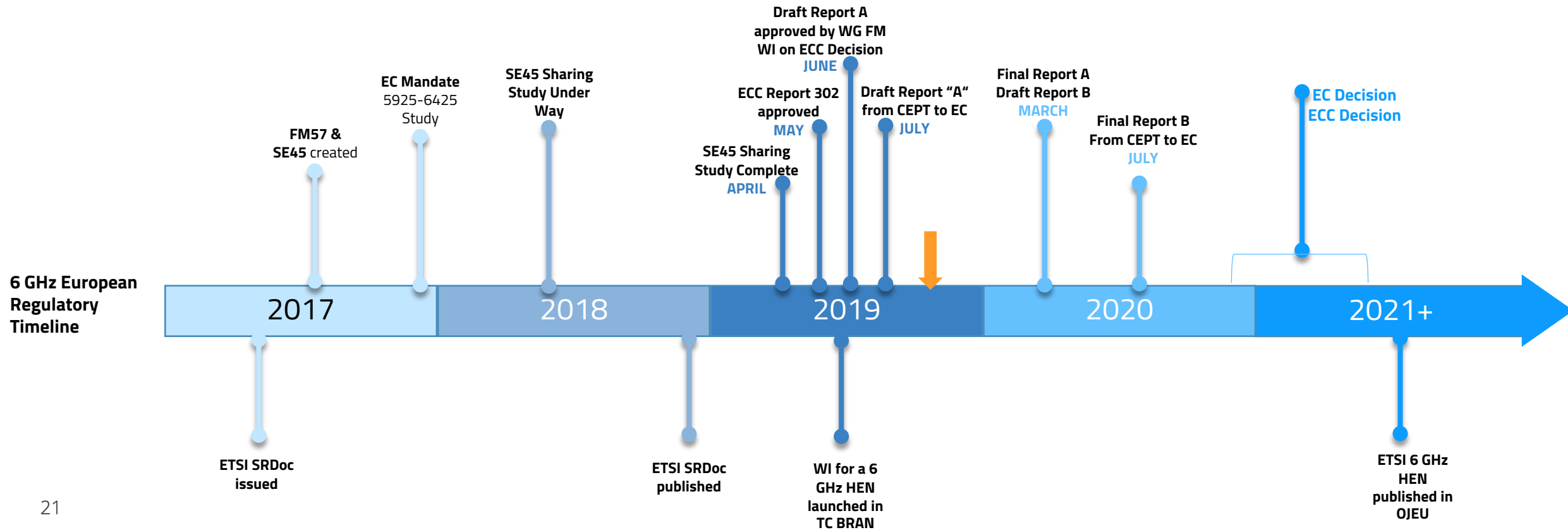
- › ETSI Standard includes rules for device manufacturers
- › ETSI Standard is required for self-certification
- › Work in ETSI is delivered by companies and regulators
- › Further work: System Reference Document (SRDoc)
describes the technical elements of a technology



STATE OF THE PROCESS IN EUROPE



> Timeline of the SE, FM and ETSI work items



ECC/CEPT REPORTS

GETTING INTO THE DETAILS

- ECC Report 302 published: <https://bit.ly/2n52keh>
- Includes studies of sharing/coexistence of Wi-Fi and the incumbent services
- Outcome and conclusions were given to the 6GHz FM group



ECC/CEPT REPORTS

GETTING INTO THE DETAILS

- CEPT Report 73 ("A") is nearly complete:
 - "[...] coexistence between WAS/RLAN (Wi-Fi) and existing services within and adjacent to the band 5925-6425 MHz will be technical feasible under certain conditions."
 - Low Power Indoor Devices and Very Low Power (VLP) outdoor devices (portable) might be allowed
 - No outdoor usage other than VLP portable devices
 - No high power usage indoor



ECC/CEPT REPORTS

GETTING INTO THE DETAILS

- › Work on CEPT Report “B” has started
- › Definition of the exact power levels
- › Exact frequency range for Wi-Fi usage
- › Other regulatory requirements



ETSI

WE ALSO NEED A STANDARD

- Based on CEPT Report “B”: Rules for transmit powers, out-of-band-emissions, transmission time, ...
- Required for self-certification
- Notified Body can work based on stable draft



6 GHZ SPECTRUM

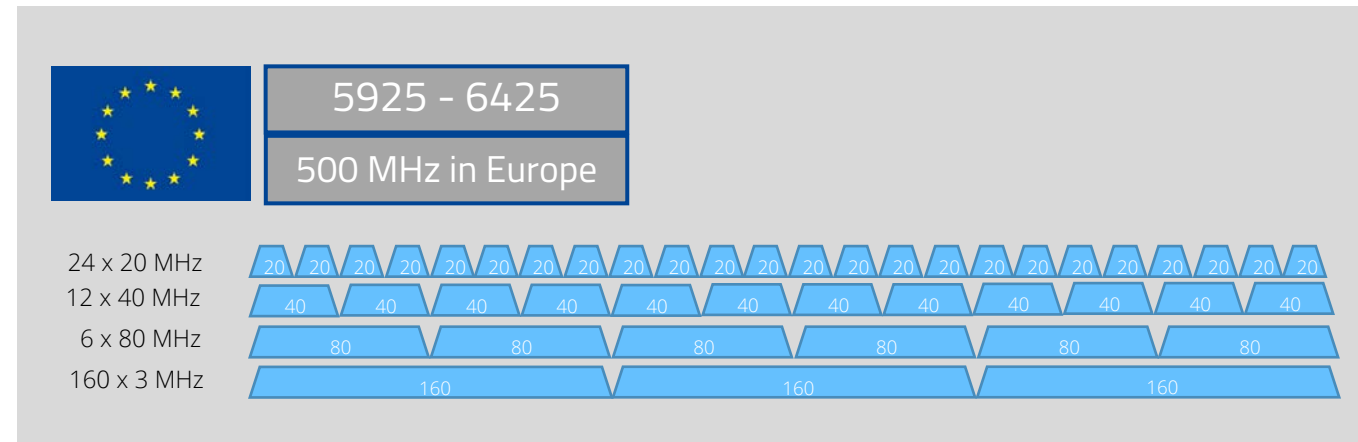
CONCLUSION



CONCLUSION

WE ARE ALMOST THERE...

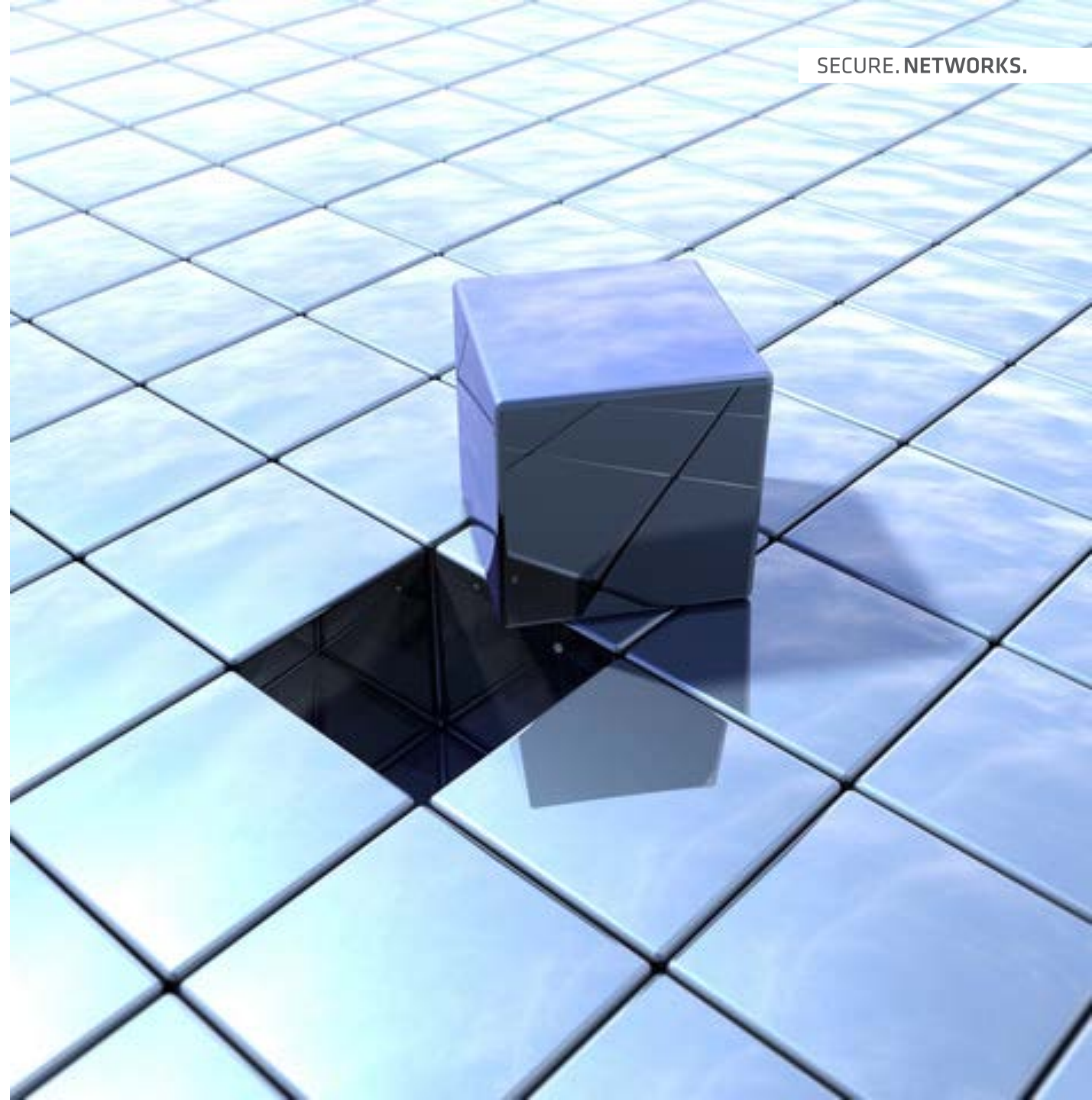
- Lower part of 6 GHz will be opened up soon
- 480 MHz of new spectrum = **24 x 20** / 12 x 40 / 6 x 80 / 3 x 160 MHz channels
- 1 band; 1 power level for APs and clients; 1 power level for mobile hotspots
- No RADAR, no DFS! 😊
- ECC Decision will open up a big market opportunity with 48 countries



CONCLUSION

SHOWSTOPPERS

- Proposal of an identification of the 6 GHz band for mobile service at the upcoming World Radiocommunication Conference 2019
- ETSI needs to reach a stable draft or final version of a 6 GHz standard within ~2 years
- Studies are technology neutral, 5G might also offer an unlicensed option(!)



THANK YOU!
QUESTIONS?

PHILIPP EBBECKE (@MTROI84)
WLPC PRAGUE 2019