

VIRVE 2.0

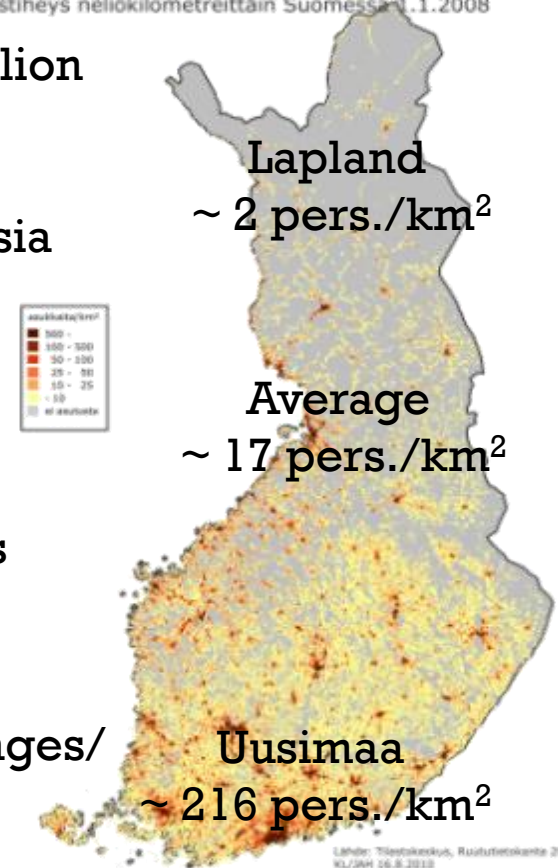
-Broadband Mission Critical Communication

PSCE 04.12.2019 Paris, Kari Junttila

Facts of Finland and Virve

Asukastiheys neliökilometreittäin Suomessa 1.1.2008

- Geographical area: 338.000 km², population: 5,5 million
(*> 35 % Larger than UK with 65 million people*)
- Member of EU; 1.340 km Schengen border with Russia
- Virve network:
 - Virve is owner and operator of the network
 - 100 % owned by State of Finland
 - 1.400 Base Stations, 17 Switches, vendor: Airbus
 - All Security Authorities in One Shared Network
 - ~ 45.000 subscribers
 - ~ 150.000 group calls and ~ 8 million SDS messages/
day

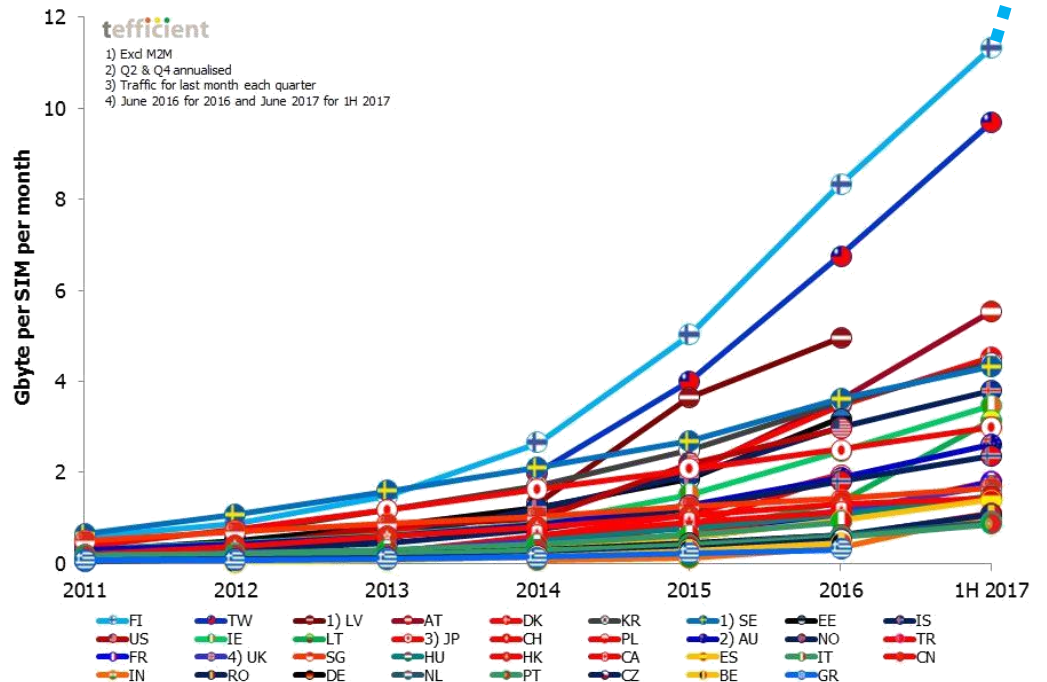
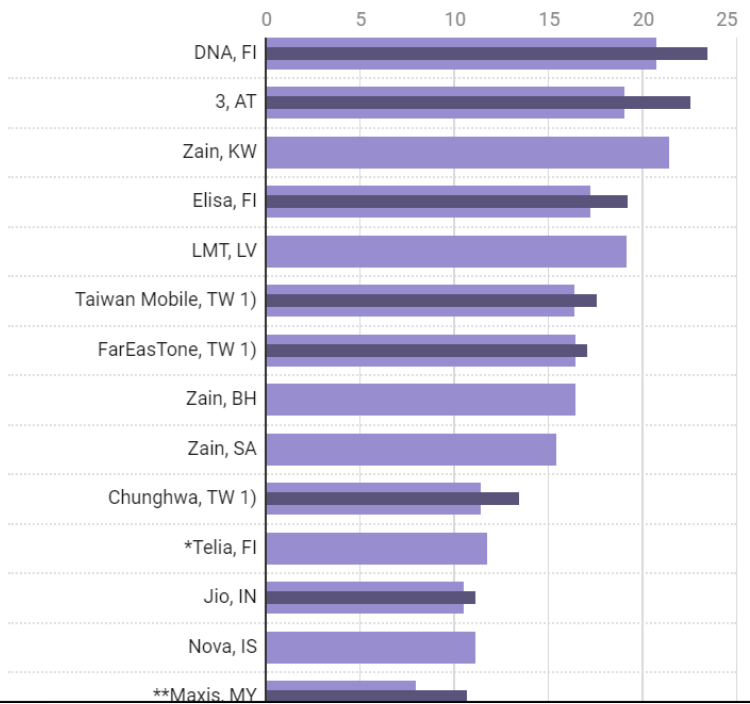


Exponential Data Growth in Finland

+ 2017 12GByte/month
 + 2019 ~24GByte/month

Tefficient: Gbyte per reported SIM per month

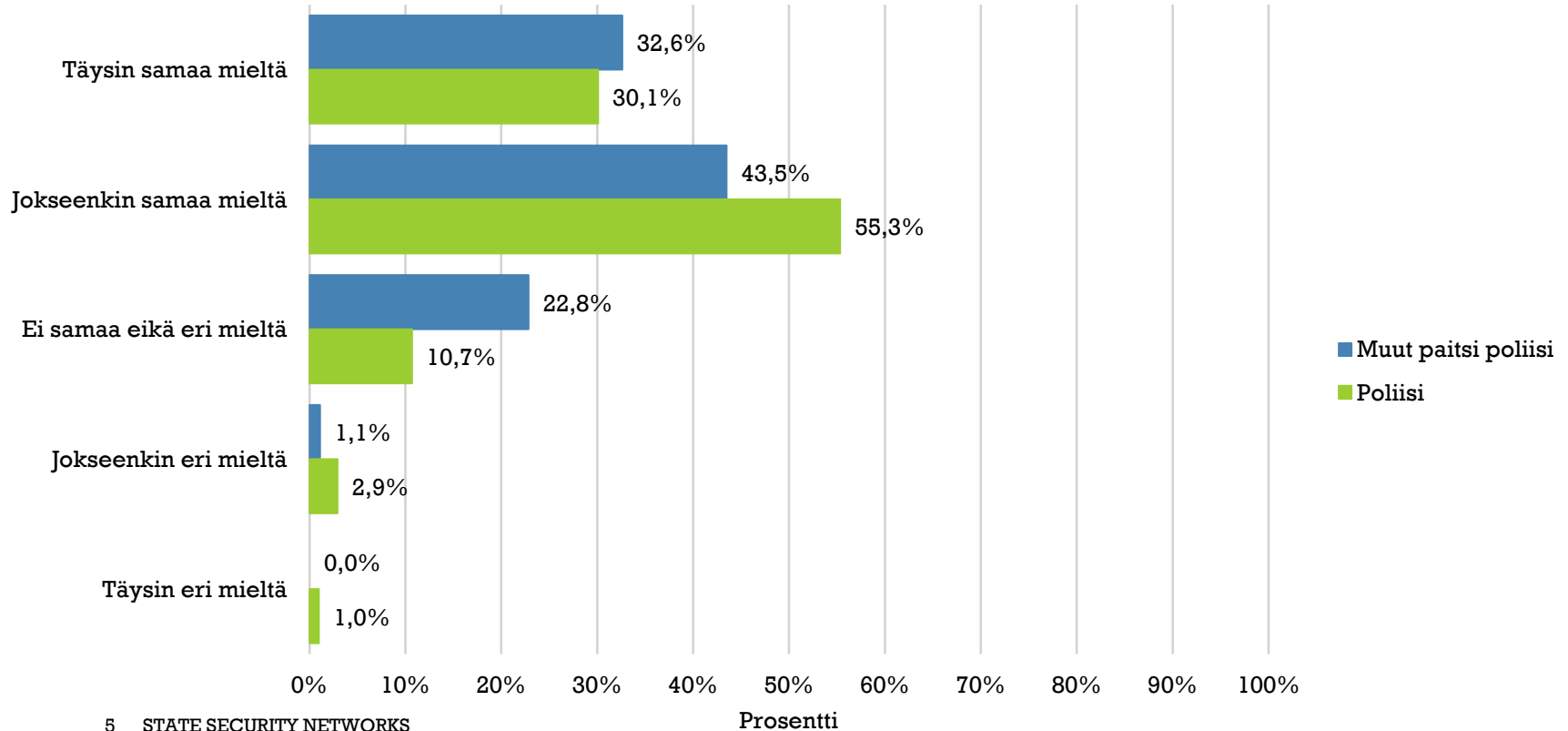
FY 2018 1H 2019



Virve 2.0 mission

“Virve 2.0 is desirable and trusted mission critical mobile broadband service for PPDR agencies and other stakeholders for national emergency supply”

Question 95: Virve 2.0 tactical base station can be part of vehicle



1st Challenge Coverage

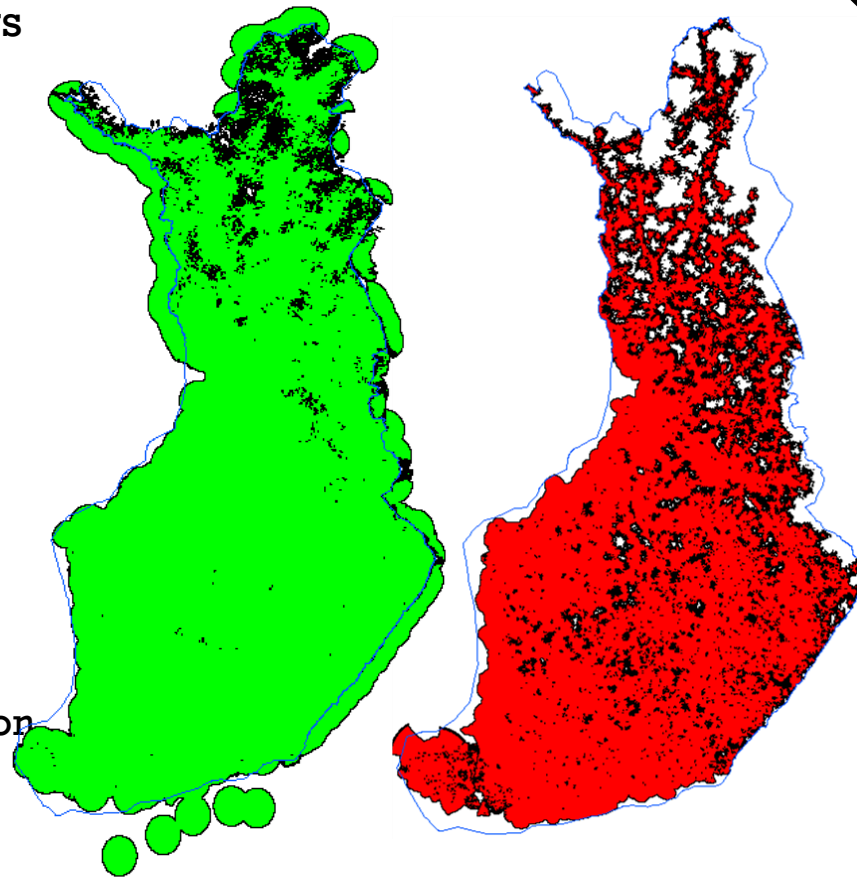
Virve Services
-95dBm

LTE Services
10/2Mbps

Virve (TETRA)

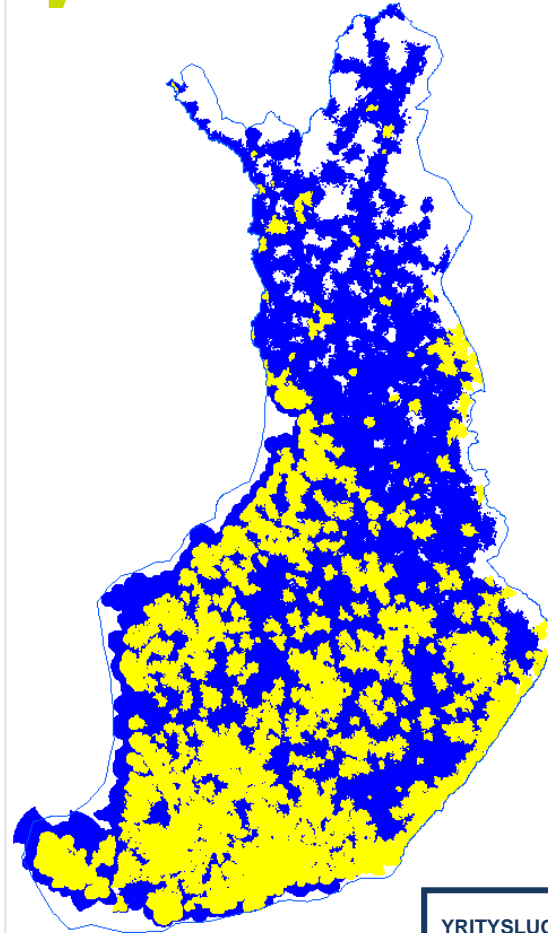
Commercial LTE

- + Tetra 380-400MHz vs. LTE 800MHz
- + Coverage(C/I) vs. Services Throughput & Users
- + Urban areas covered & ALL Capacity
- + BUT:
 - + Is QPP functionalities fast/good enough?
- + How to fill the gap?
 - + Build new masts?
 - + Build Tactical BTS?
 - + There is compromise between services
- + Terminal sensitivity/power
 - + With or without external antennas/connector
- + Losses:
 - + - 6dB frequency 400MHz vs. 800MHz
 - + -10dB vehicle penetration losses
 - + Higher indoor losses -10dB vs. -15dB
 - + Propagation – Penetration – Reflection – Diffraction



2nd Challenge Capacity

- + Rural areas only 2x 10MHz
 - + ~90% geographical coverage (dominance) area
- + What are options to guarantee capacity on large scale events?

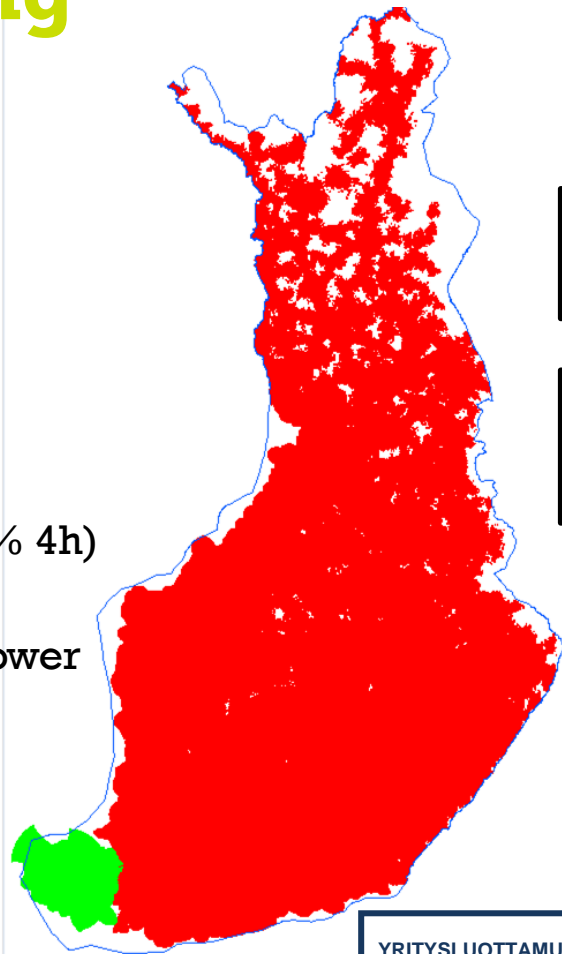


Capacity
20MHz

Capacity
10MHz

3rd Challenge Hardening

- + What are the best options?
 - + Lead acid, Fuel cells, generators?
 - + Other solutions?
- + How many hours is enough?
 - + Statistics of power outages
- + National regulation
 - + LTE 15min (2G&3G 3h (and oh those 30% 4h)
- + EU regulation
 - + 24h Voice service for restoration from power outages



Battery backup
15min

Battery backup
3 hour

YRITYSLUOTTAMUKSELLINEN
Suomen Erillisverkot -konserni

Governmental decisions

- + In 700MHz auction in Finland public safety was not given a frequency, instead it was decided by ministry of transport and communications that commercial networks could fulfill the needs of the public safety.
- + Task force from the ministry of finance concluded that Suomen Erillisverkot would be the best organization to function as a service operator.
- + WRC 2023 (470 -600MHz) next change for Public Safety in Europe...

New Legislation 2019

- + Quality of Service
- + Priority
- + Pre-Emption
- + National Roaming
- + The obligation to use

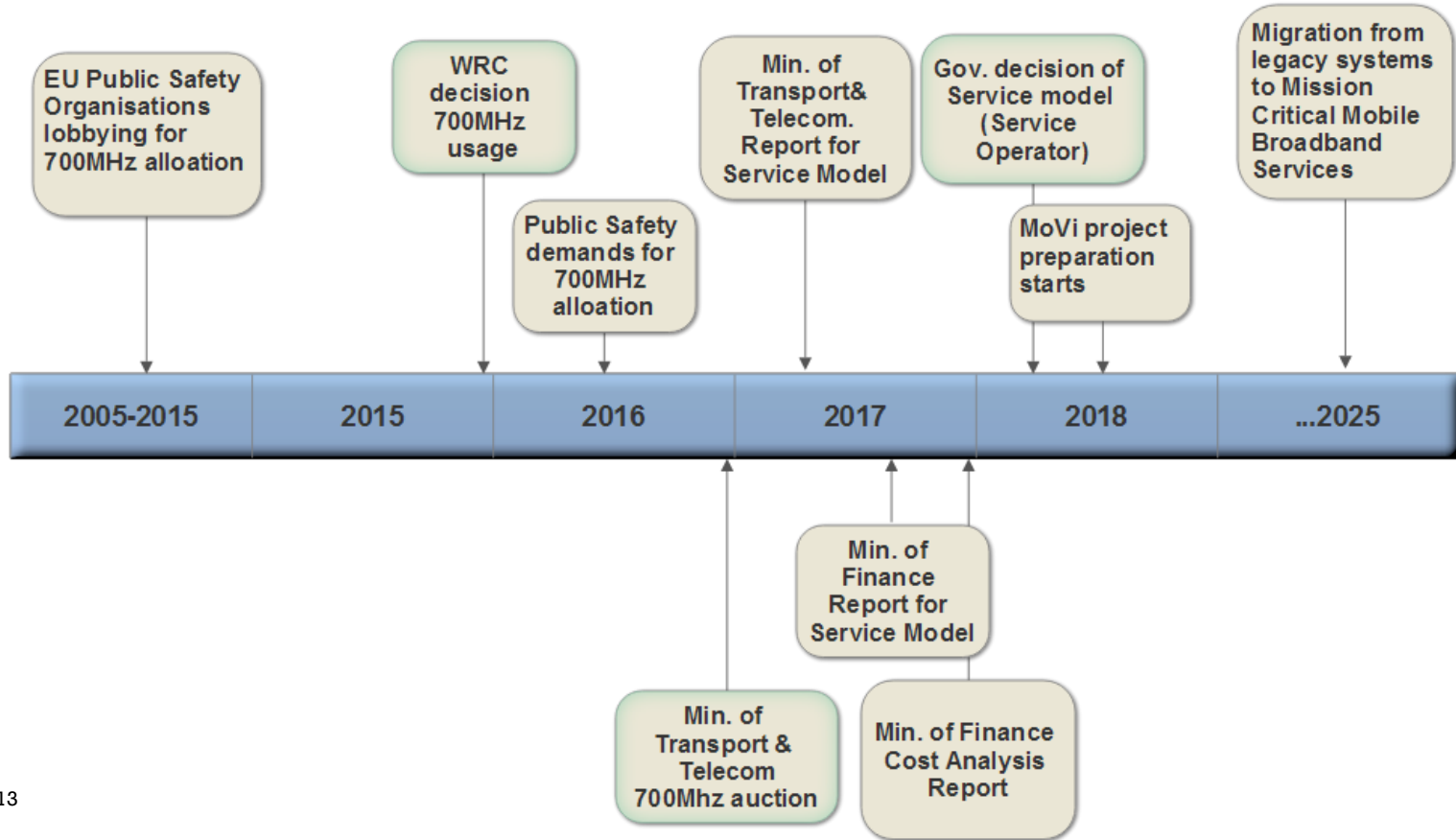
Prerequisites

- + MCBB strategy (to whom, what and when)
 - + Commitments from User Organizations to co-operate
- + Business plan (TCO...)
- + Legal framework (enablers)
- + Migration plan

User organizations involvements

- + Active communication with all stakeholders
 - + Common needs identified
 - + No-one get what they want without strong commitment to test and development
- + Joint and consistent message toward technology providers
 - + Also internationally together
- + It's all about MCX services
 - + All aspects are important

Roadmap to Mission Critical Broadband



Virve 2.0 –
Program started



2018

Virve 2.0
Prioritized
Broadband
Subscription



2021

Virve 2.0
Mission Critical
Applications



2022

Virve 2.0 In Use
Nationwide



2025

TETRA-Virve services



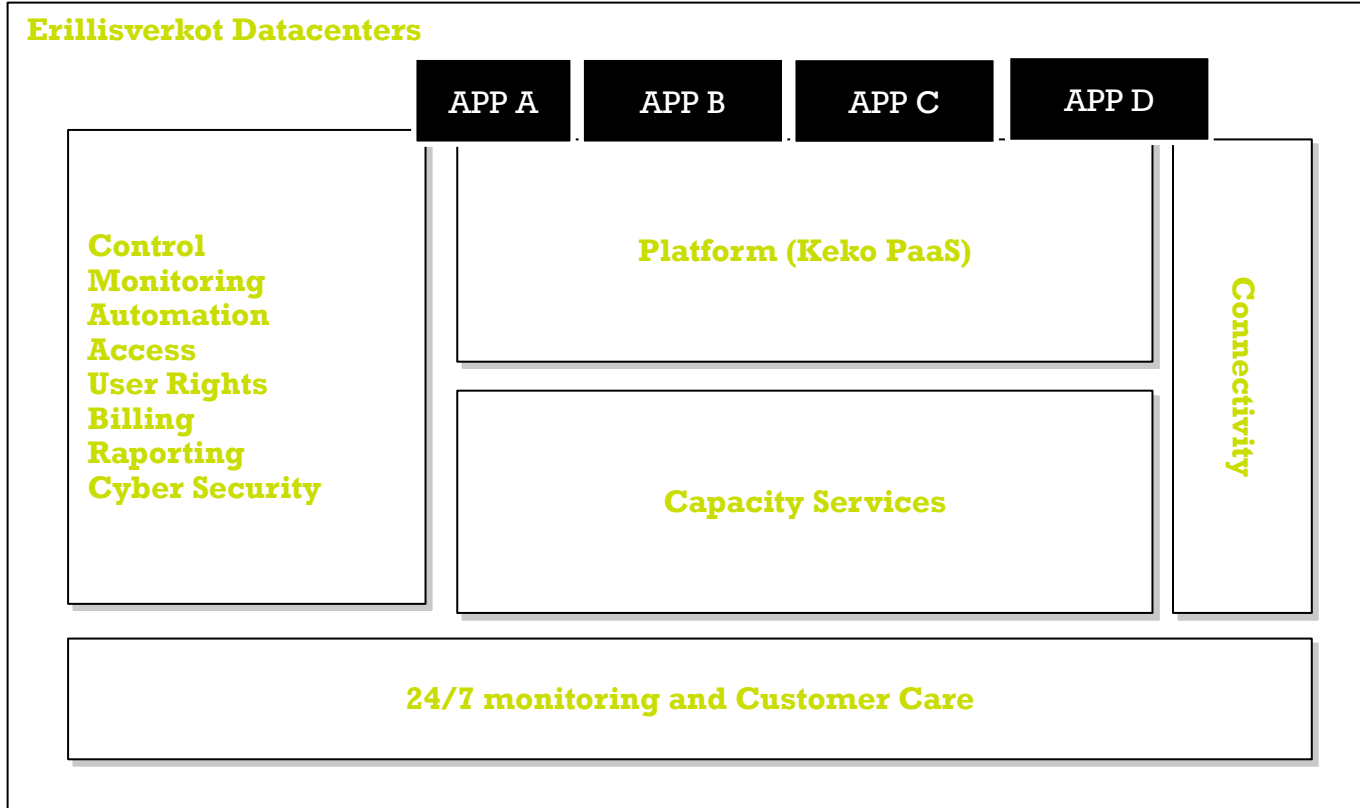
Phases

- + Procurement of RAN as service and MOCN core (ongoing)
 - + Request For Quotation 01/20 (final)
- + Coverage extensions
- + Hardening of the network
- + Mission critical services
- + Terminals (critical for migration)
 - + Antenna connector – external antenna (for <1GHz)
 - + Vehicle mounted radios
 - + D2D
 - + Wearable communication

Services - incremental approach

- + Q1/21 Data(pilot Q3/20)
- + Q3/21 VoLTE
- + Q2/22 MCPTT
- + Q3/22 MCVideo
- + Q1/23 National Roaming
- + Q2/23 International Roaming

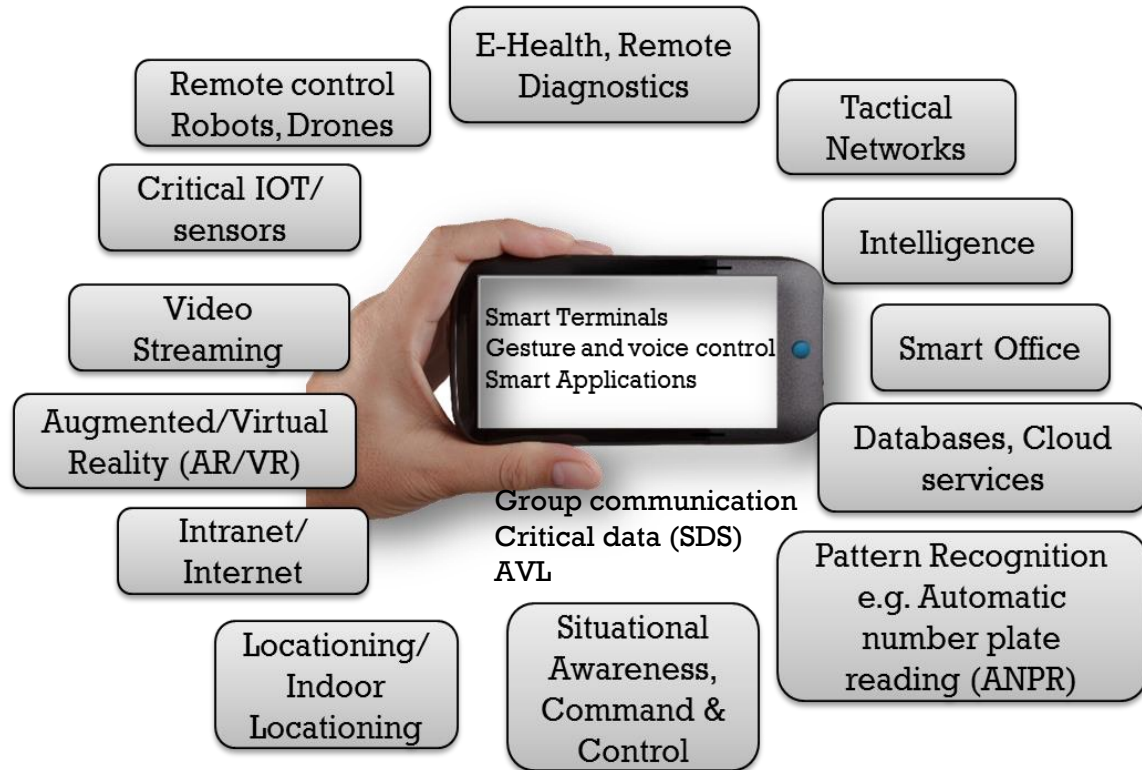
Virve 2.0 Service Architecture



Challenges and Lessons learned

- + Geographical coverage - for what services and how many users?
- + Capacity is not issue in cities - but Indoor coverage is...
- + Tactical BTSs or Batteries? (ROI)
- + Time plan – Add 50% more time - everywhere -
- + Communication between stakeholders both nationally, European level and Globally
- + Political decision making
- + Funding
- + Continuous development of the technology
- + Future is almost here:
 - + NLOS Drone control, autonomous swarms of Drones and U-SPACE

Virve 2.0 enables new use cases and services



Public papers

+ RFI RAN & CORE



Adobe Acrobat
Document

+ White Paper of the RFI



Adobe Acrobat
Document

+ RFI MCS



Adobe Acrobat
Document

Thank you!

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