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INFOCOM 2019

5G-TOURS: 5G smarT mObility, media and e-health for toURists and citizenS

5th Generation Network Applications in Transport and Tourism

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GROUP OF COMPANIES

5G Tours: Main objectives

The touristic city: The visitors of museums and outdoor attractions are provided with **5G-based applications** to enhance their experience while visiting the city. This includes VR/AR applications to complement the physical visit with additional content, involving interactive tactile communications.

The mobility-efficient city: Mobility to reach and move inside the city is made more efficient and comfortable. This involves smarter cities, gathering information about the city and using it to improve navigation systems as well as parking. Traveling is also made more enjoyable, providing AR/VR services to passengers, and airports become logistically more efficient by relying on **5G** for their operation.

The safe city: **5G technology** greatly improves the safety in the city by providing means to better assist health-related care in all the phases of an incident, ranging from the health monitoring for prevention and early detection, to diagnosis and intervention at the ambulance, and surgery at the wireless operation room in the hospital.

5G Tours: Consortium

5G-Tours: OTE's Contribution - Leader in **The mobility-efficient city**

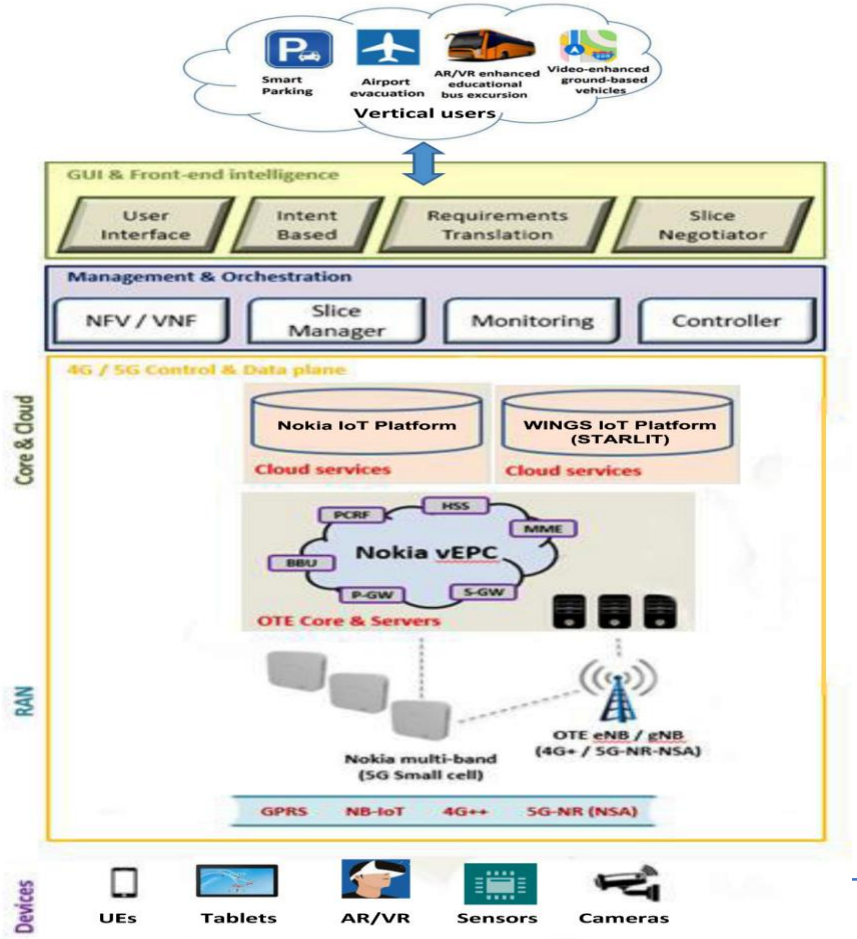
- The aim of these use cases is to demonstrate how 5G is expected to enhance applications related to mobility within a city, covering various setups, such as:

  - **Smart parking management**
  - **Airport evacuation**
  - **Video-enhanced ground-based vehicles**
  - **AR/VR Enhanced educational bus excursion**

Technical issues common for all use cases of the Greek Node

5G-EVE infrastructure

- The four use cases of the Greek node will rely on the 5G-Infrastructure developed in the area of Psalidi/Maroussi, at the facilities of OTE-Academy.
- The infrastructure is implemented by OTE, NOKIA-GR and Ericsson GR.



Technical issues common for all use cases of the Greek Node

NOKIA-GR

- Installation of Antennas (3 indoor, 2 outdoor) – 5 pairs
- Coverage for 3 places in AIA
- Workshop with AIA + NOKIA for coverage and final position survey
- Need to get approval for the installation
- Fiber connections to antennas
- Using the 5 pairs of antennas the four Greek node use cases will be covered
- The antennas will be connected to the NOKIA's infrastructure in Psalidi.

OTE:

- Provides 10Gbps line connection with the AIA, for the interconnection with the OTE Labs in Psalidi, where the infrastructure of the 5G-EVE project are installed (by OTE & NOKIA).
- the frequency use of 3600-3800 MHz, we have initiated communication with the department of OTE which will send all required documentation to Greek Authority EETT to allow us to use this frequency range for pilot experimenting
- SIM cards will be provided for the needs of all use cases

Technical issues common for all use cases of the Greek Node

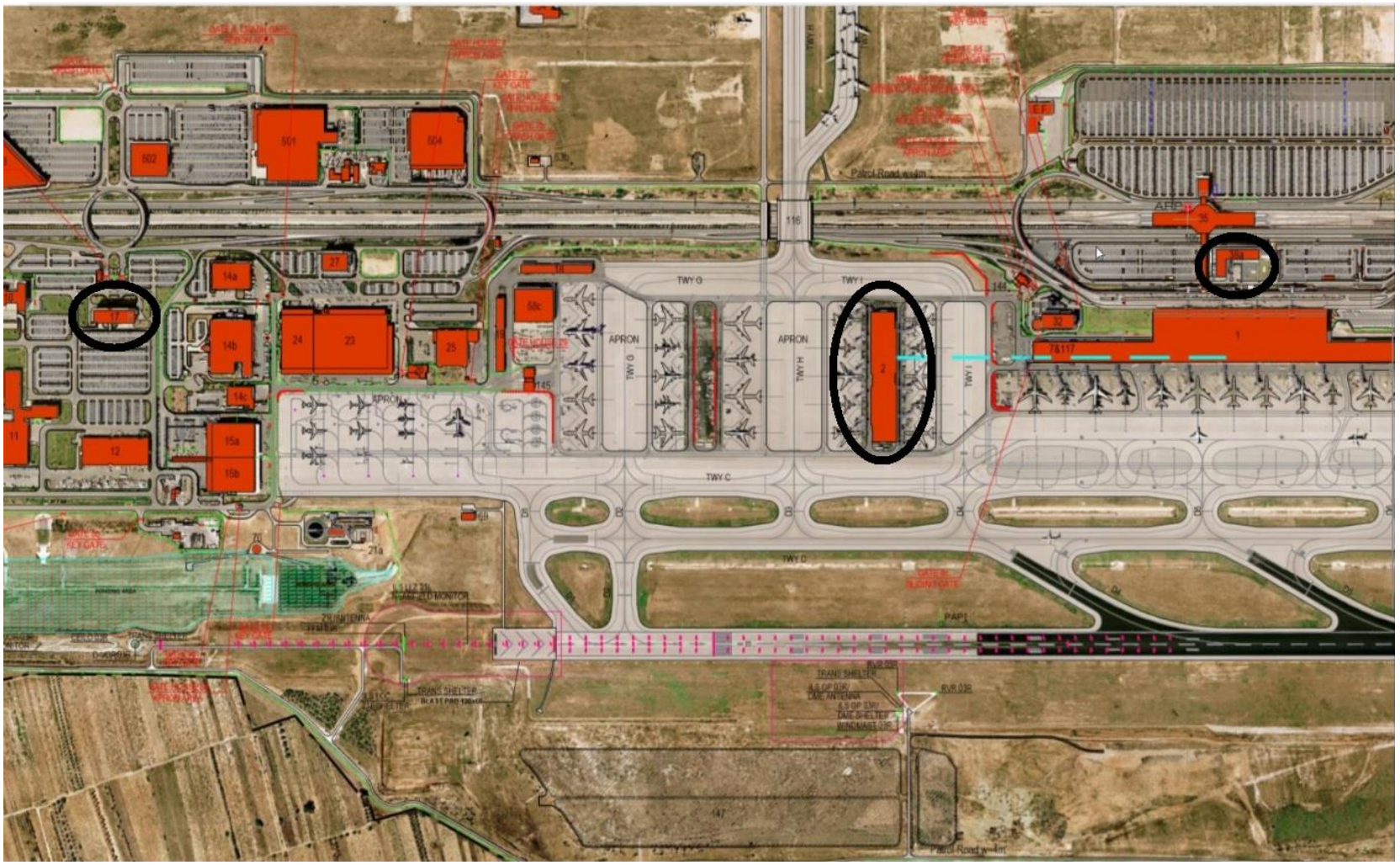
ACTA: has to setup probes between test points

- KPI Validation
- ACTA and NOKIA and AIA will cooperate in order to find the final positions of probes.
- Data will be collected in KPI Validation Platform
- Measured KPIs: Latency, Throughput, packet loss, frame loss, jitter e.tc

Samsung: will provide:

- Smart phones for Smart Parking
- Smart phones for Evacuation
- 3 x 5G routers, 3x 4K UHD Cameras, 3 x 5G tablets for the Ground-based vehicles
- 25 Smart Phones, 25 GearVR headsets for AR/VR Bus excursion

Technical issues common for all use cases of the Greek Node – area of AIA



Progress on Smart parking management

Parking area:

- The use case will be implemented in Staff parking area of AIA

Sensors:

- WINGS will provide and install 90 4G sensors and 10 5G

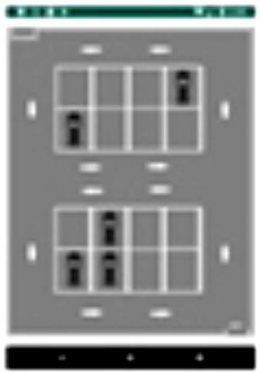
Chipsets:

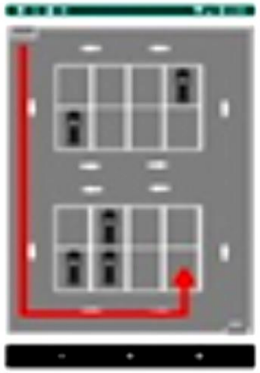
- **Sequans** will provide **10 5G chipsets**
- Workshop **Sequans + WINGS** for the usb connection of chipset and sensor and, as well as the ruggedized case witch will be used
- The chipsets will be connected through SIM cards (provided by OTE) to the 5G Antennas

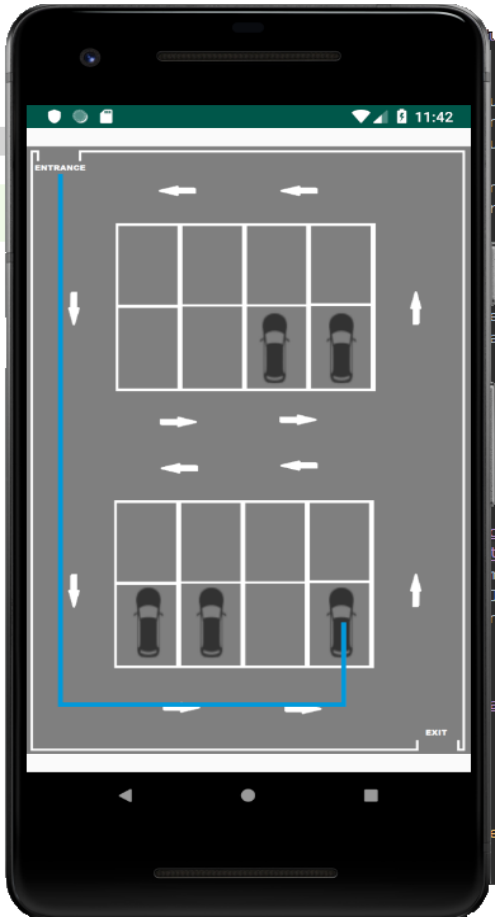
Application:

- WINGS will develop application for smart parking outdoor navigation of **parking availability** and **optimal routing**

Progress on Smart parking management







Progress on Airport evacuation

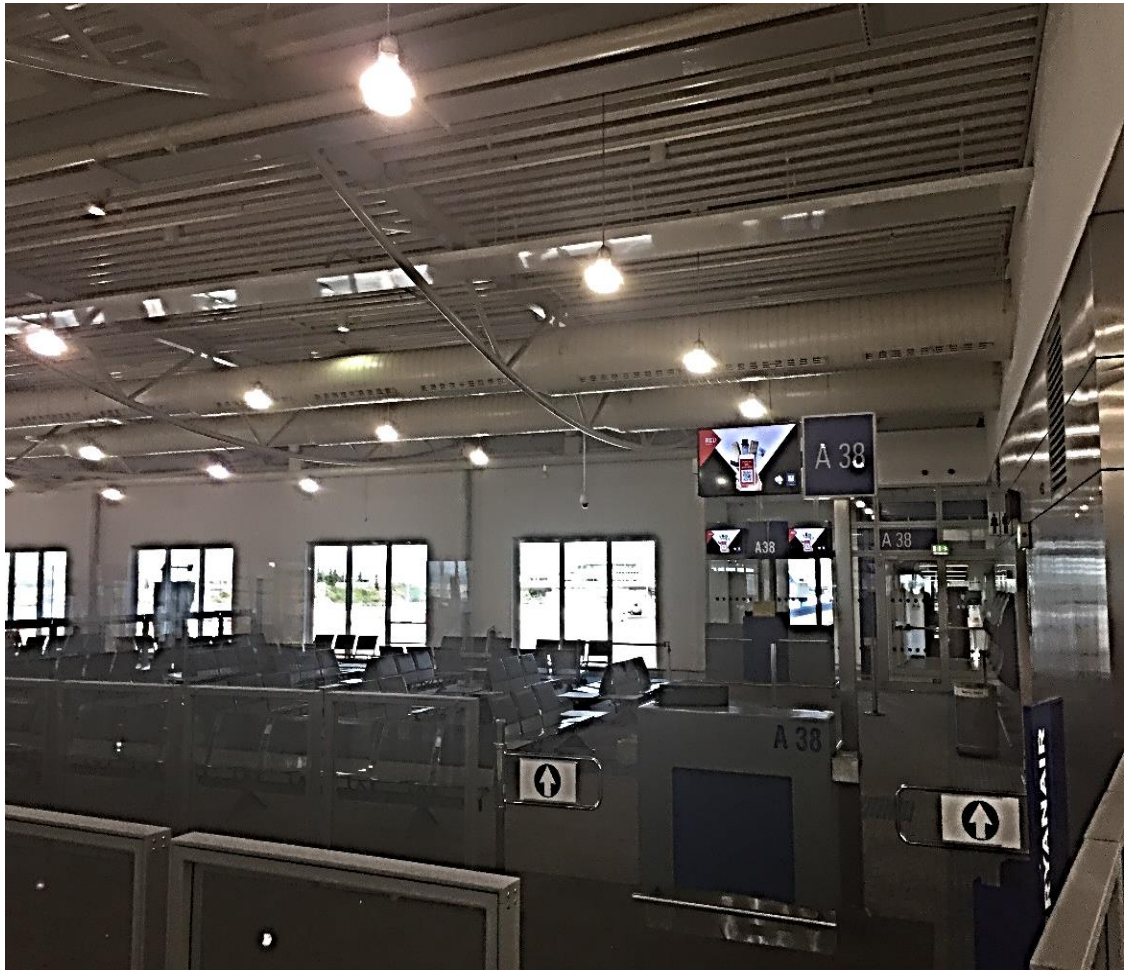
AIA :

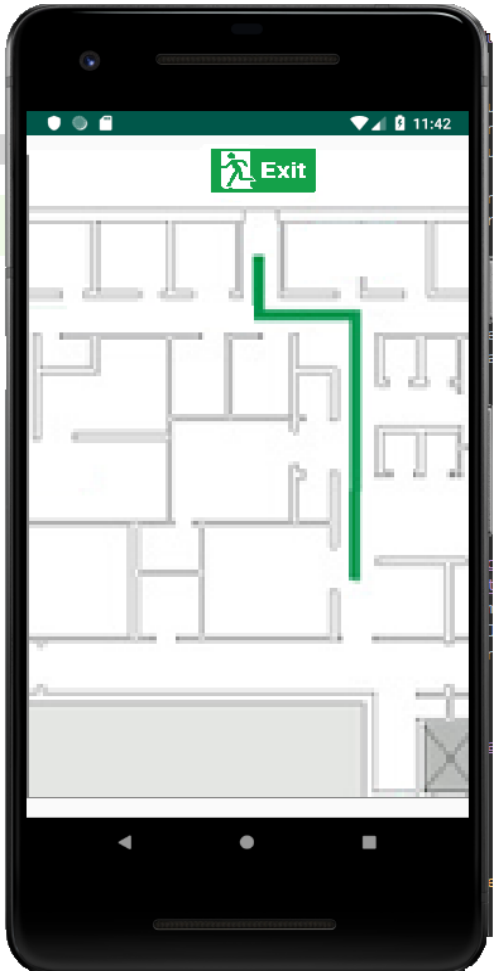
- 75 volunteers will be used during the evacuation trial
- Specific evacuation methodology will be used and Security plan
- 2 gates will be used A37, A39 from AIA Satellite terminal
- 3 Indoor antennas will cover the UC provided by NOKIA
- All the evacuation process will be video recorded for the need of proof of concepts

WINGS: will develop application

- User Localization services using triangulation - using 3 indoor micro-cells antennas installed by NOKIA (depends whether NOKIA will install indoor antennas)
- App will run in mobile smart phones provided by **Samsung**
- The app will send emergency message to the users and will navigate users by optimal routing towards the two exits (A37, A39)

Progress on Airport evacuation
Satellite terminal for the Evacuation





Progress on Video-enhanced ground-based vehicles

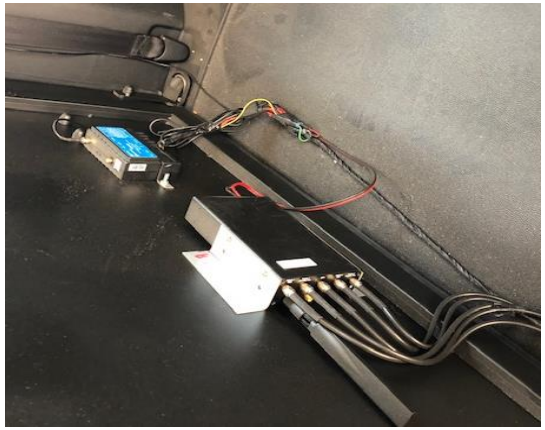
AIA:

- 3 x Follow me cars will be provided by AIA,
- 3 x 4H UHD Cameras, 3x 5G routers have to be installed on the cars
- 3 x 5G tablets
- ONVIF protocol is needed for cameras (under consideration)
- In case of emergency on line video streaming has to be send via server (AIA) to Police, Ambulances and Fire brigade operational center.
- SIM cards for 5G routers and tablets will be needed
- High bandwidth for transmitting the 4K UHD video is needed. (10 Gbps line will be provided by OTE)
- Coverage (in an area of ~3 Km^2)

WINGS:

- will provide application for the video streaming (implementation/configuration of video streaming software)
- Approaches: the cameras send 4K video to a server and the Server streams the data to the internet in parallel (be 3 parallel and simultaneously 4K streams)
- Investigation for the production of a script (SW) for the selection of a scenario or parallel scenarios running at the same time for showing the live feed of ground based vehicles

Progress on Video-enhanced ground-based vehicles



Progress on AR/VR student bus excursion

EA:

- 20-25 students
- The area of exhibition (Museum of Acropolis in AIA)

  Two scenarios:

  A) Students in the moving bus

  B) Students in the exhibition in the AIA Acropolis Museum
- Educational material for studying on a running bus (**Virtual Reality) -** by EA
- Educational material for studying at the AIA exhibition area (**Augmented Reality**) – by EA
- The tour of the school bus will be around Building 17 at AIA facilities. It is into the coverage area of NOKIA's antennas.
- EA is responsible for the educational material and historical data
- The material will be provided by EA, as well as the 3D models.
- Usage of the AIA Exhibition room, for the student's excursion, with the theme of Ancient Greek Acropolis and the reconstruction of the face of "Myrtis" young girl.
- The physical reconstruction of the face of "Myrtis" is ready

Samsung:

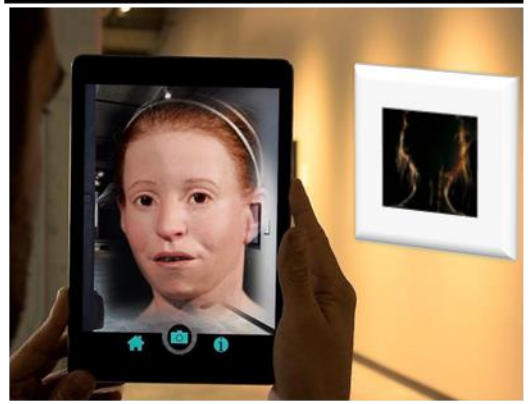
- For the needs of VR : Samsung GearVR headset
- For the needs of AR: Samsung S10 Smart phone or similar device
- VR application will provided by Samsung

ATOS:

- Need for 2-3 devices for development
- AR application by ATOS (front end and back end)
- The apps will cover different scenarios (provided by EA)

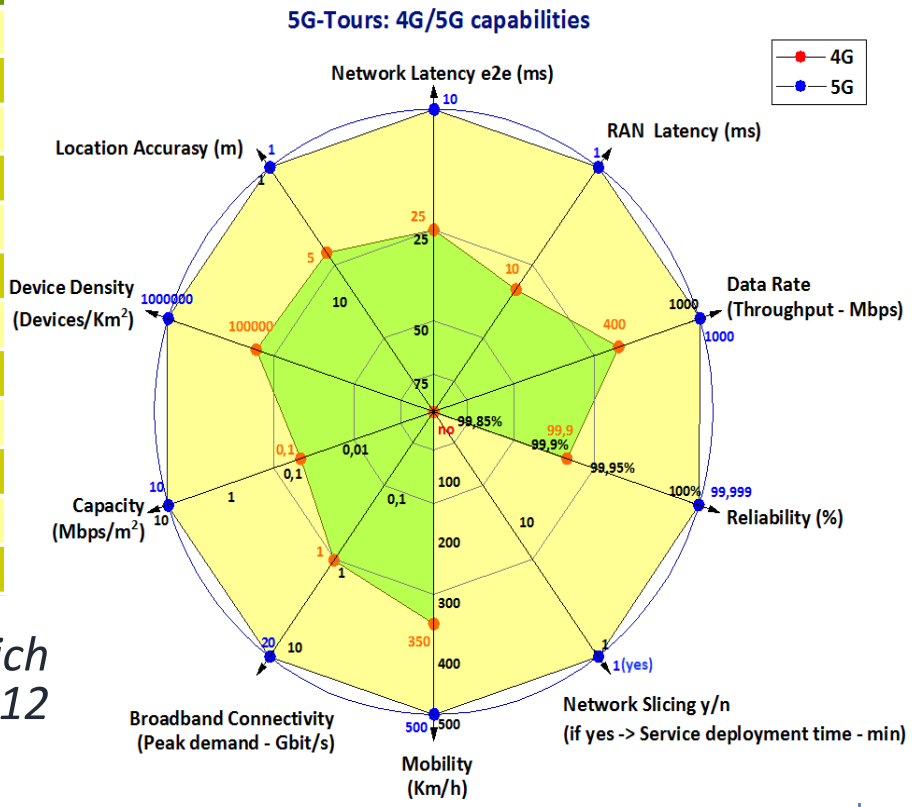
Progress on AR/VR student bus excursion

The theme of exhibition is the reconstructed face of an anonymous 11-year-old Athenian girl who was – along with Pericles – one of the tens of thousands of victims of typhoid fever in the year 430 BC. The girl is conventionally named Myrtis.



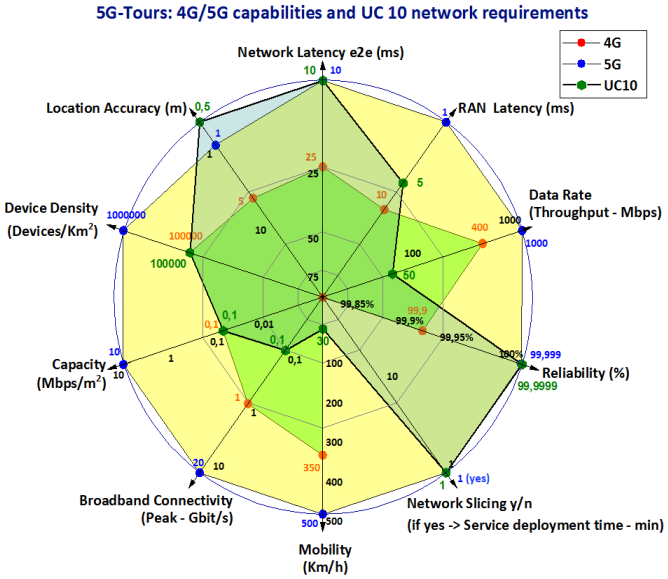
OTE's contribution in Technical Requirement Analysis

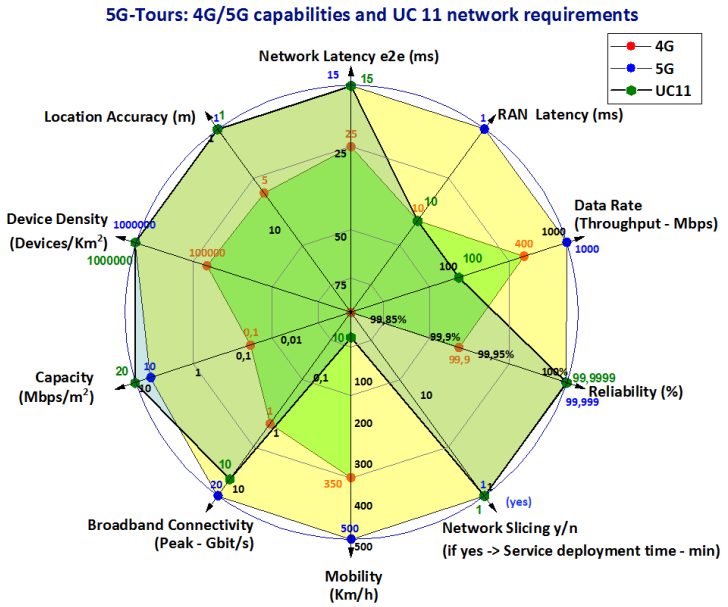
	General 4G/5G Capabilities	Units	4G	5G
1	Latency (in milliseconds) - round trip - Min/Max	msec	25	10
2	**RAN** Latency (in milliseconds) - one way	msec	10	1
3	Throughput (in Mbps) - Min/Max - sustained demand	Mbps	400	1000
4	Reliability (%) - Min/Max	%	99,9%	99,999%
5	Availability (%) - Min/Max	%	99,9%	99,999%
6	Mobility (in m/sec or Km/h) - Min/Max	Km/h	300	500
7	Broadband Connectivity (peak demand)	Y/N or Gbps	1	20
8	Network Slicing (Y/N) - if Y service deployment time (min)	Y/N	N	Y (1 min)
9	Security (Y/N) - if Y grade i.e. "Carrier Grade"	Y/N	Y	Y
10	Capacity (Mbps/m^2 or Km^2)	Mbps/m^2	0,1	10
11	Device Density	Dev/Km^2	100K	1000K
12	Location Accuracy	m	<5	<1

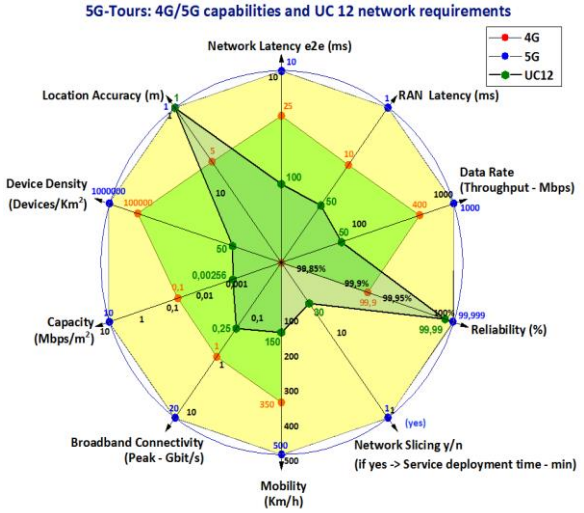


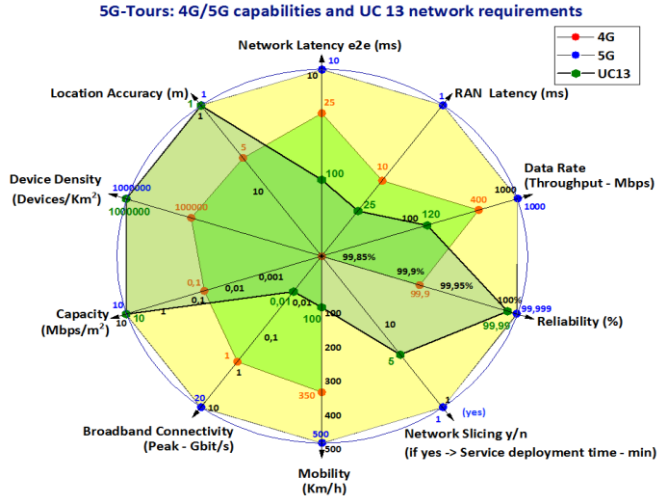
- *This is a **multi-axis radar chart** which corresponds to a comparison of 4G/5G 12 capabilities.*
- *Radar charts can be used as a reference for mapping each Use Case Requirements*
- *Analysis of each UC can be derived easily as an output from this chart*

OTE's contribution in Technical Requirement Analysis









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Thank you!

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