

“Smart 5G small cell street pole infrastructure for digital service ecosystem in future urban city environments”



5GTNF demo seminar 15.11.2018

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LuxTurrim5G - Building key enablers for a Digital Smart City

“Smart 5G small cell street pole infrastructure for digital service ecosystem in future urban city environments”

LuxTurrim5G is a Nokia Bell Labs driven Finnish public funded Smart City Ecosystem research project innovating and piloting novel digital services and business opportunities for a real smart city.

Partner companies:



Smart cities require fast communication networks

Smart cities require a new service infrastructure and a truly digital ecosystem enabling :

- Development of smart city **services**
- **High data capacity** for citizens
- New service and **business opportunities** for companies
- **One common flexible total cost optimized high capacity 5G network**
- Opportunities for new **micro-operators** in the systems

Need

Our modern society and growing cities face great **challenges** nowadays, e.g. to improve :

- safety
- energy efficiency
- air quality
- effectivity of transportation
- general quality of living



LuxTurrim5G - Solution

LuxTurrim5G develops and pilots concrete technology enablers and service concepts for open Smart City Digital Ecosystem

Indoor/Outdoor connections

Signal propagation through construction materials
- RF permeable windows:
Lammin Windows

5G network

High capacity, low latency
Small cells -> many sites
5G network: **Nokia Bell Labs**
Light pole: **Exel Composites**
Radom materials: **Premix**

Operators

Business models for:
- Existing ones
- **New ones?**

Smart city services on top of a common platform

Examples:

- Video surveillance, public safety, infotainment screens: **Teleste**
- Air quality, weather: **Vaisala**
- Location, navigation: **Indagon**
- Lighting/charging: **Ensto**
- Drones: **Rumble Tools**
-

Public partners contributing in each research area:
VTT, Aalto, TUT

City Infrastructure

Light pole infra, power, data transport
Infra planning: **Sitowise**
Infra owner: **Espoo,...**

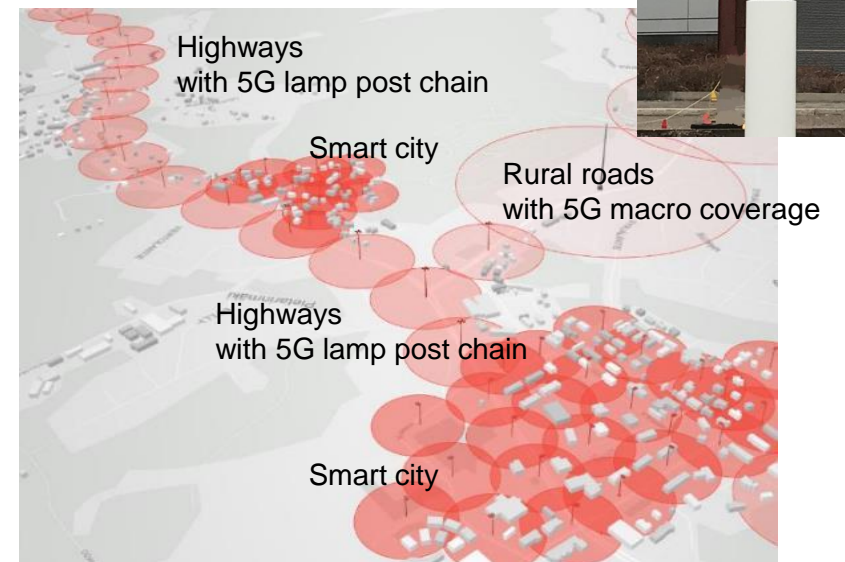
Citizens

Transportation

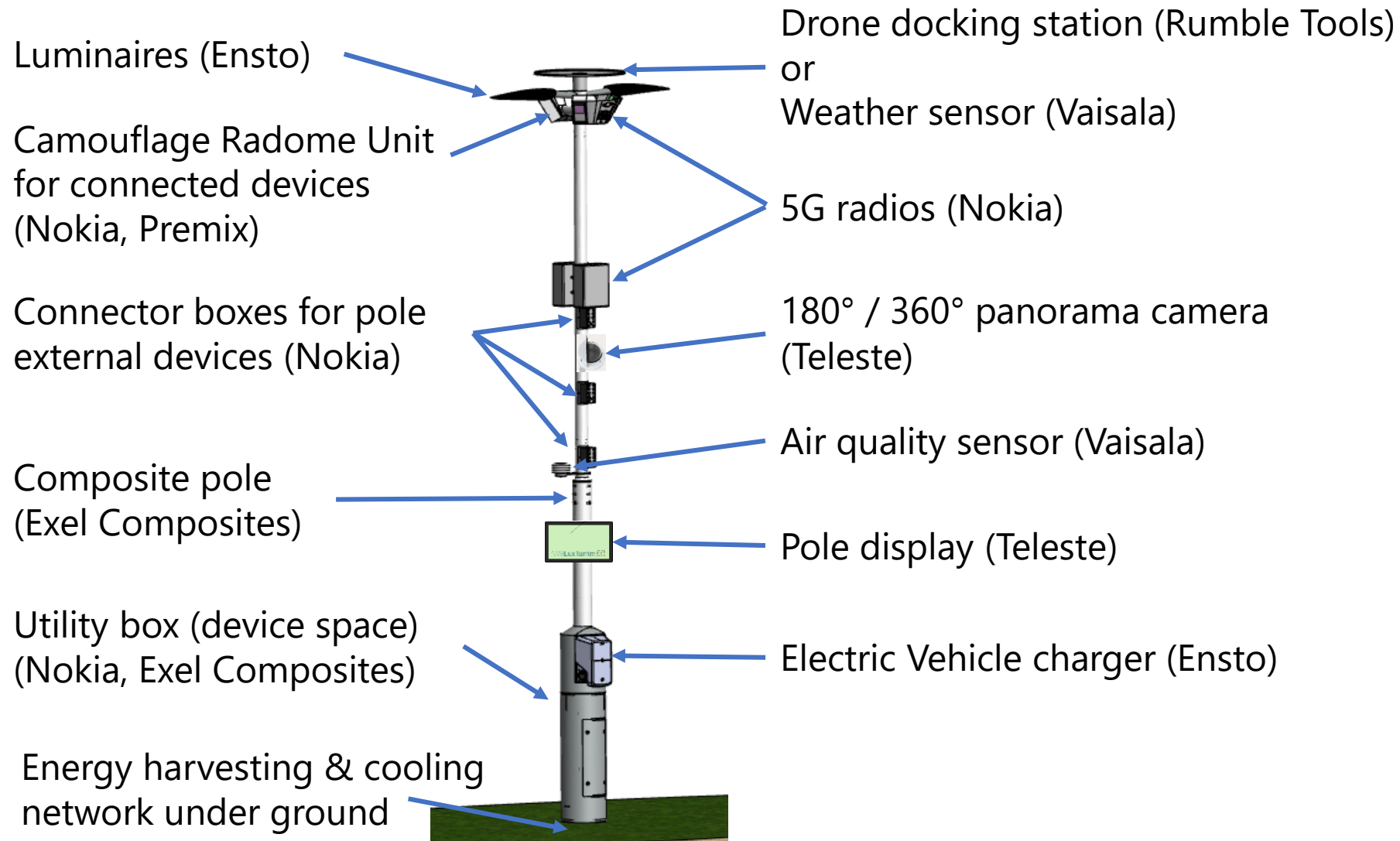


LuxTurrim5G Approach and Targets

- Develop and demonstrate key technical solutions and concepts based on ***smart 5G light pole infrastructure with integrated / camouflaged 5G mmW radios, sensors, cameras, information displays and other devices.***
- Create ***open access ecosystem, business model and technology platform*** for digital services which could be extended to sub-urban, rural areas and highways
- Build a real life real time ***outdoor test and demo network*** in Nokia Espoo campus to demonstrate new innovations on top of and enabled by 5G small cell infrastructure
- ***Pilot business & service innovations*** on e.g. navigation, information sharing & advertisement, public safety, weather monitoring, building automation and smart lighting



LuxTurrim5G smart light pole concept



2nd prototype at Nokia campus

LuxTurrim5G is the connectivity platform of future projects

- **LuxTurrim5G outdoor test network** in Nokia HQ Espoo Karaportti campus area in Espoo is *open for innovations for all consortium partners*
- Close **co-operation with city of Espoo**, e.g. Kera area building
- During 2019 – 2020 LuxTurrim5G provides the connectivity platform for **Neutral Host pilot project** and start-up company NeutralHost Oy.
- Part of Finland wide 5G Test Network Finland (**5GTNF**) **co-operation and 5G research** funded by Business Finland



Recent International Recognitions



City of Espoo
**awarded as Intelligent Community
 of the Year 2018, 6.6.2018 London**

Flagship ecosystem project

Business Finland Director General Pekka Soini: "Case LuxTurrim5G –co-operation is the key",
 100 Lasissa! Smart city and environment 12.12.2017 Helsinki

Nokia: "Best Project in Interaction with Local Ecosystem" award winner Nov/2018

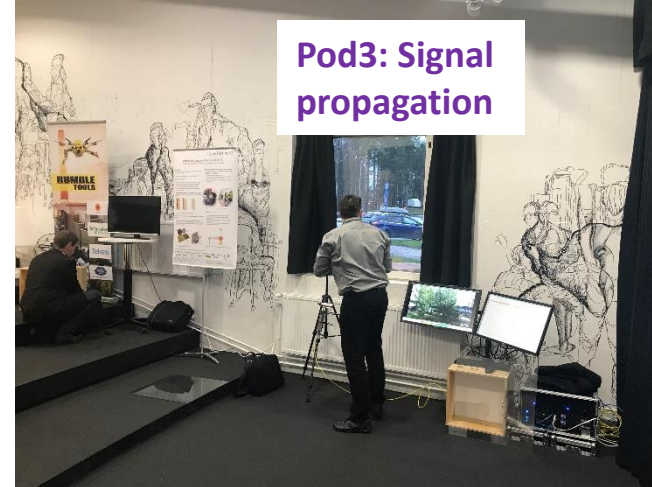


Exel Composites & LuxTurrim5G
Innovation Competition Finalist
 at JEC World 2018, 8.3.2018 Paris



LuxTurrim5G 5GTNF seminar demo pods

The "hipster lecture room"



The entrance



LuxTurrim5G demo pods at 5GTNF demo seminar 15.11 (1)

- Pod1: General Project Introduction
- Pod2: Video analytics & Small Cell Service Platform
 - Privacy protection via video anonymization & a gesture/pose controlled information display
 - Service awareness video
 - SCSP: a virtualized runtime environment for applications at the edge of the mobile network – enables localized service delivery for verticals
- Pod3: Signal propagation through materials
 - Outdoor-To-Indoor signal propagation Quality-of-Experience HW demo: visualize effects of the signal loss in network performance and service quality from user perspective
 - Signal propagation measurements: Indoor and outdoor attenuation in 5G
- Pod4: Smart Light Pole
 - Pole concept including connected devices, 3D printed scale models
 - design aspects: effect of aging on mechanical and signal propagation properties of polymeric materials



LuxTurrim5G demo pods at 5GTNF demo seminar 15.11 (2)

- Pod5: Radio prototypes
 - 28 GHz radio, 64 element phased array
 - 73 GHz backhaul radio, beamsteerable lens antenna
- Pod6: Positioning services & applications
 - Outdoor-Indoor positioning demo
 - Protos: RTK station, drone & robot
- Pod7: Business cases and smart city services
- Pod8: Smart City Infrastructure and Service Planning
 - Smart city service planning: radio layer, infrastructure, sensors, cameras
 - use case visualization: autonomous bus scenario
- Pod9: City Drone





www.luxturrim5G.com

Building key enablers for a Digital Smart City
- already today



SITOWISE

VAISALA

TELESTE

INDAGON

ENSTO

RUMBLE
TOOLS



PREMIX

