



# 5G Core Networks Interoperability Testing between KR & EU

5G CHAMPION

**5G** Communication with a **H**eterogeneous, **A**gile  
**M**obile network in the **P**yeongchang **w**inter **O**lympic  
competition**N**

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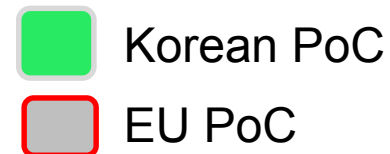


## 5G CHAMPION AT THE WINTER OLYMPICS

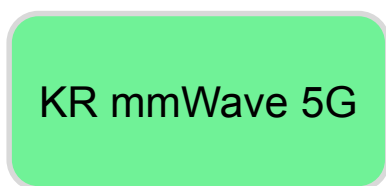
Use-cases	5G BUS Multiuser VR/AR High quality video streaming
Where	IoT street, Gangneung, Korea
EU-KR System	vEPC, mmW backhaul moving hot-spot
Frequency	EU: 26.5 - 27.3 GHz KR: 25.14 - 26.14 GHz
KPIs	LOW-LATENCY: <2ms over-the-air and <10ms end-to-end; MOBILITY: 100 Mbit/s user-experience in moving hot-spots (bus); mmW BACKHAUL: 2.5 Gbit/s <b>TESTBEDS: intersystem interoperability</b>



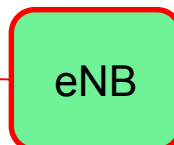
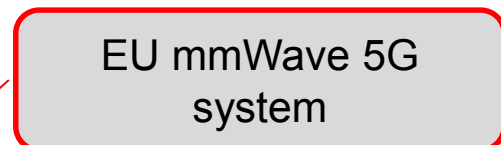
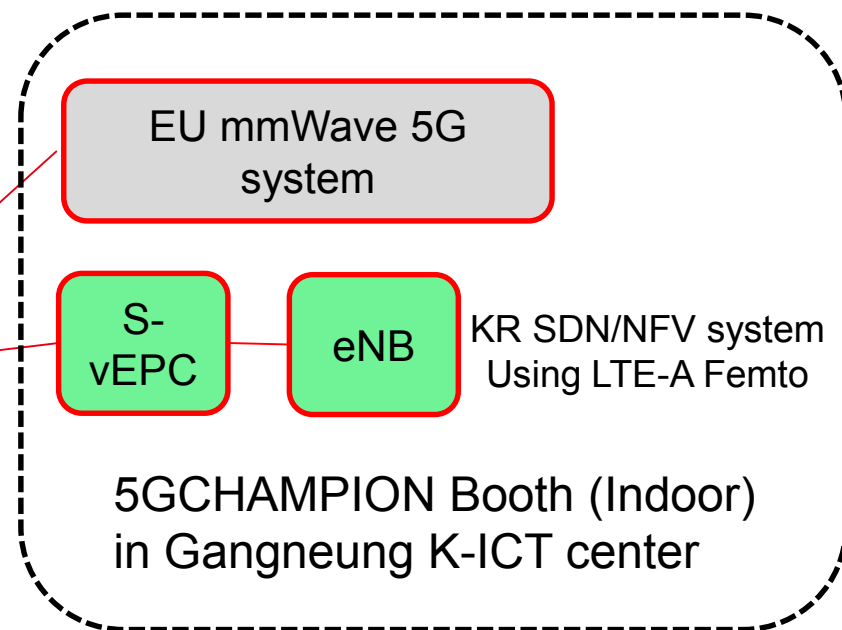
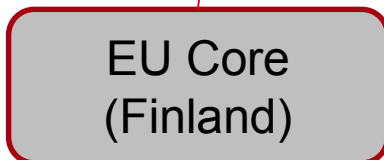
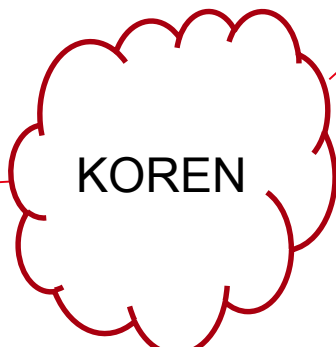
## 5GCHAMPION Demonstration – Feb. 2018



### KR mmWave 5G System



IoT Street  
(Yulgok Street)  
(using Demo BUS)

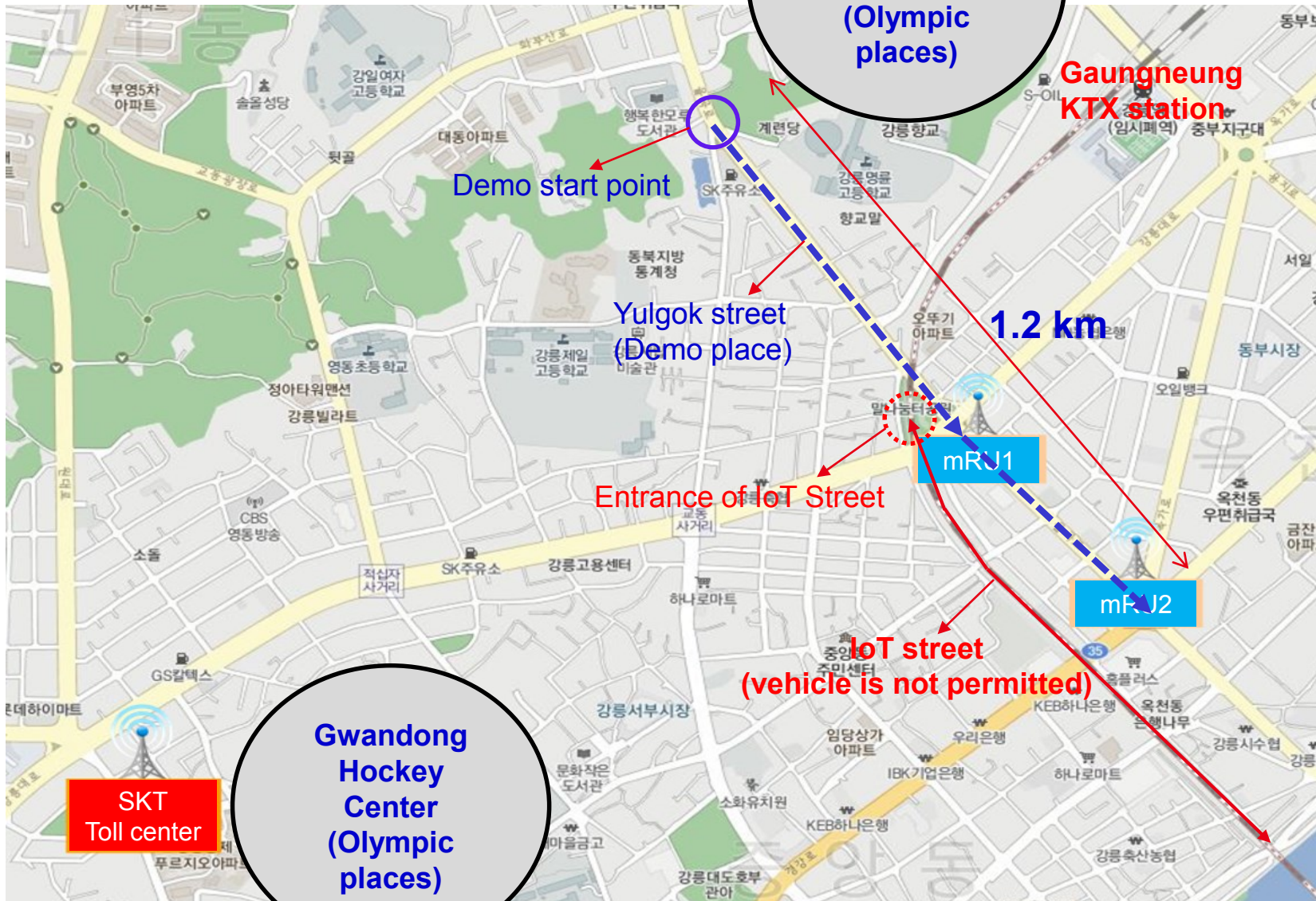


KR SDN/NFV system  
Using LTE-A Femto

5GCHAMPION Booth (Indoor)  
in Gangneung K-ICT center

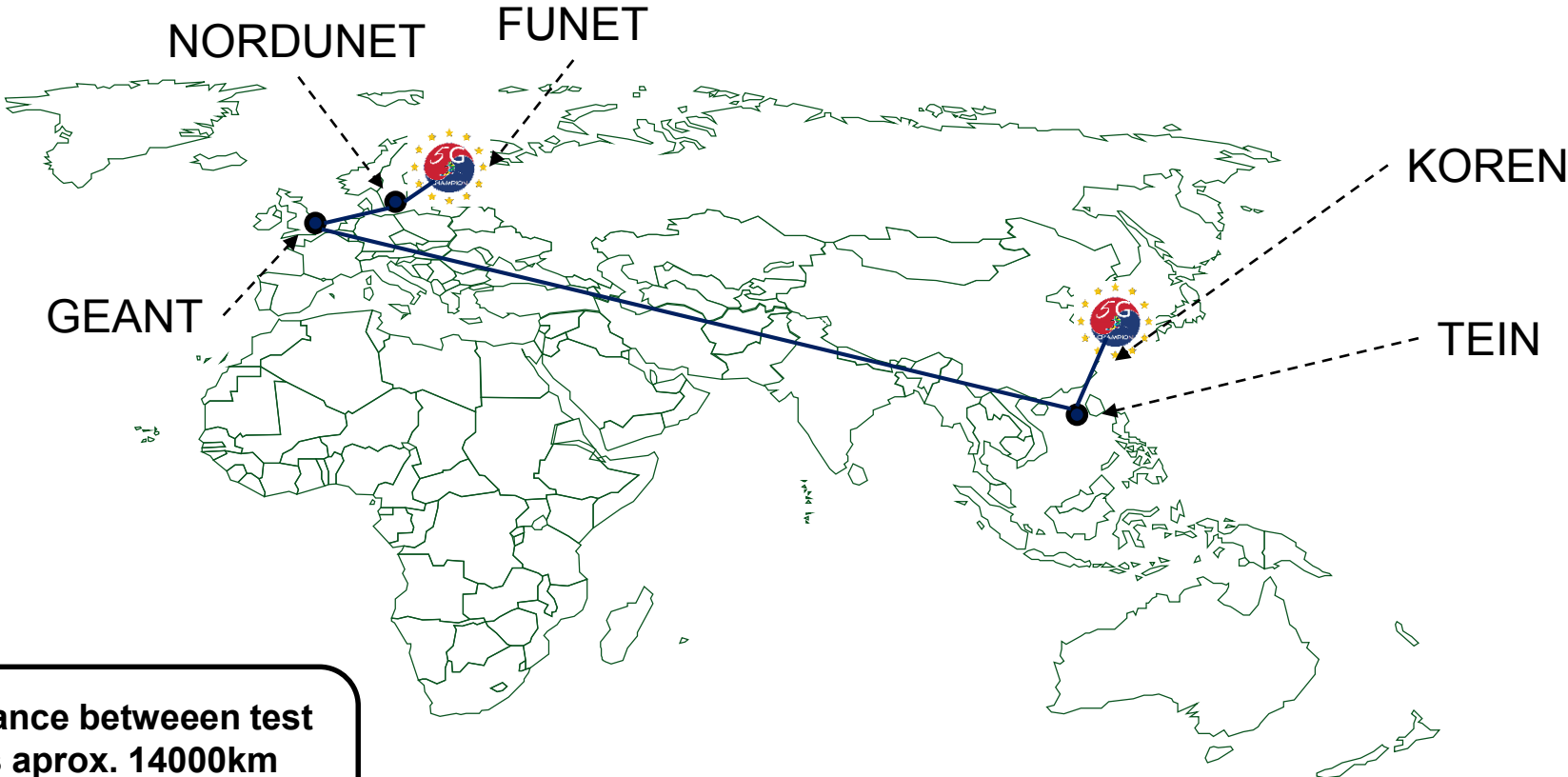


# Radio candidate sites as of M12



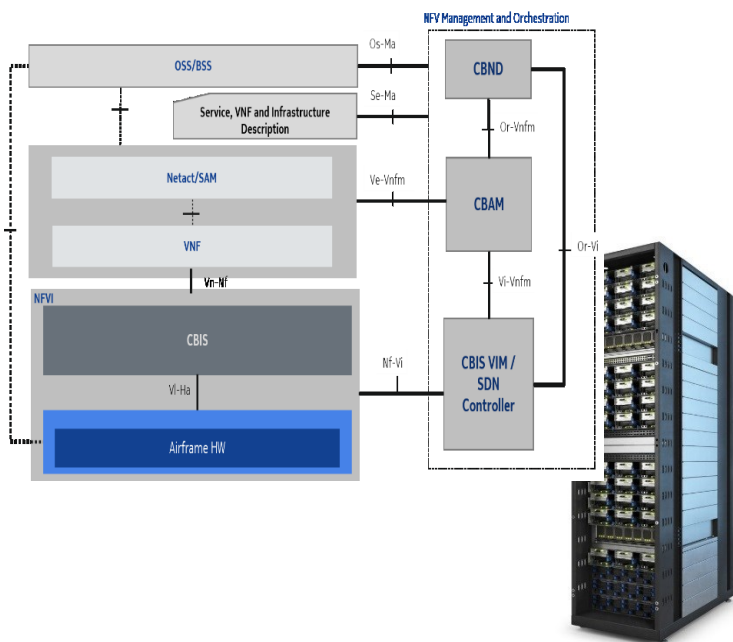
# 5GCHAMPION global interconnection

## Dedicated interconnection between Finland and Korea

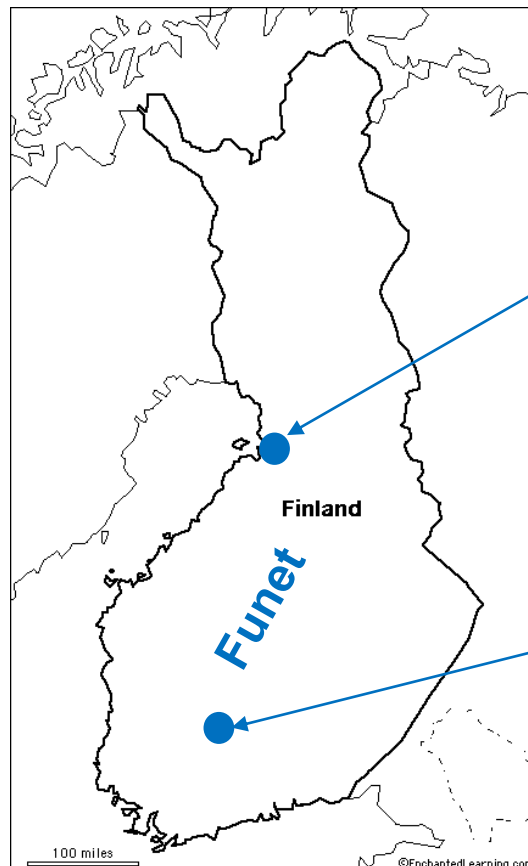


- Distance between test sites aprox. 14000km
- Latency ~300ms

# EU Mobile Core Deployment in 5G Champion (Oulu)



Main test site in Oulu, supporting network functions like registers used from Tampere

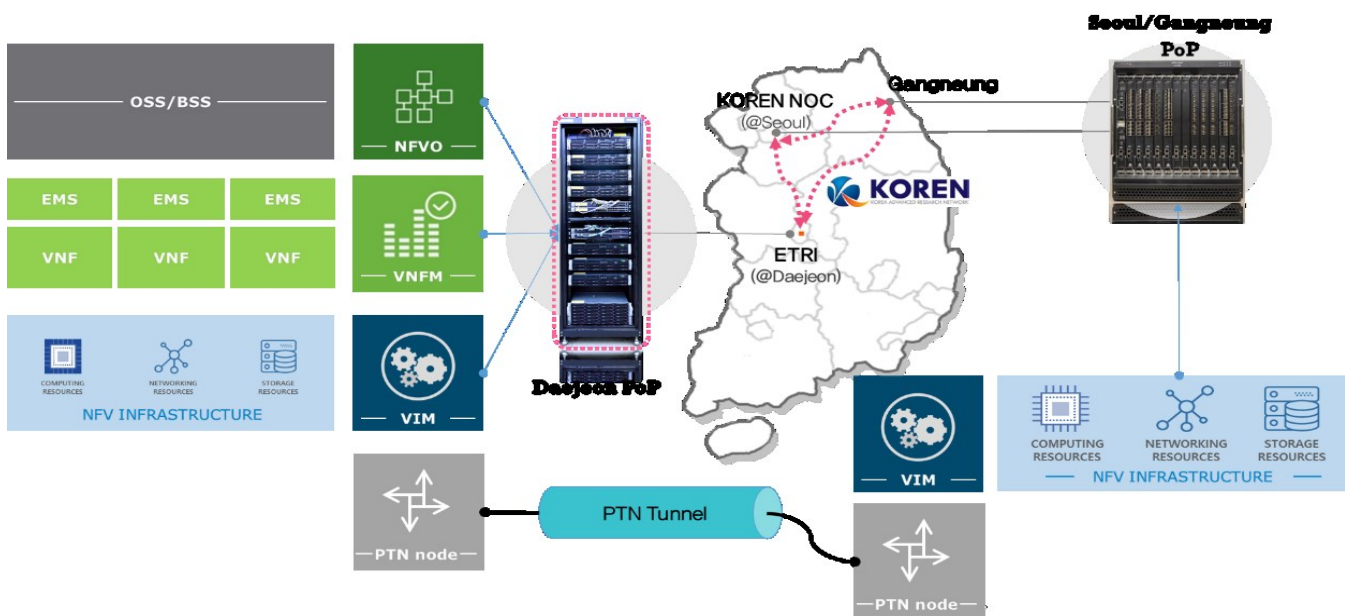


Oulu:  
 • UOULU  
 • Nokia

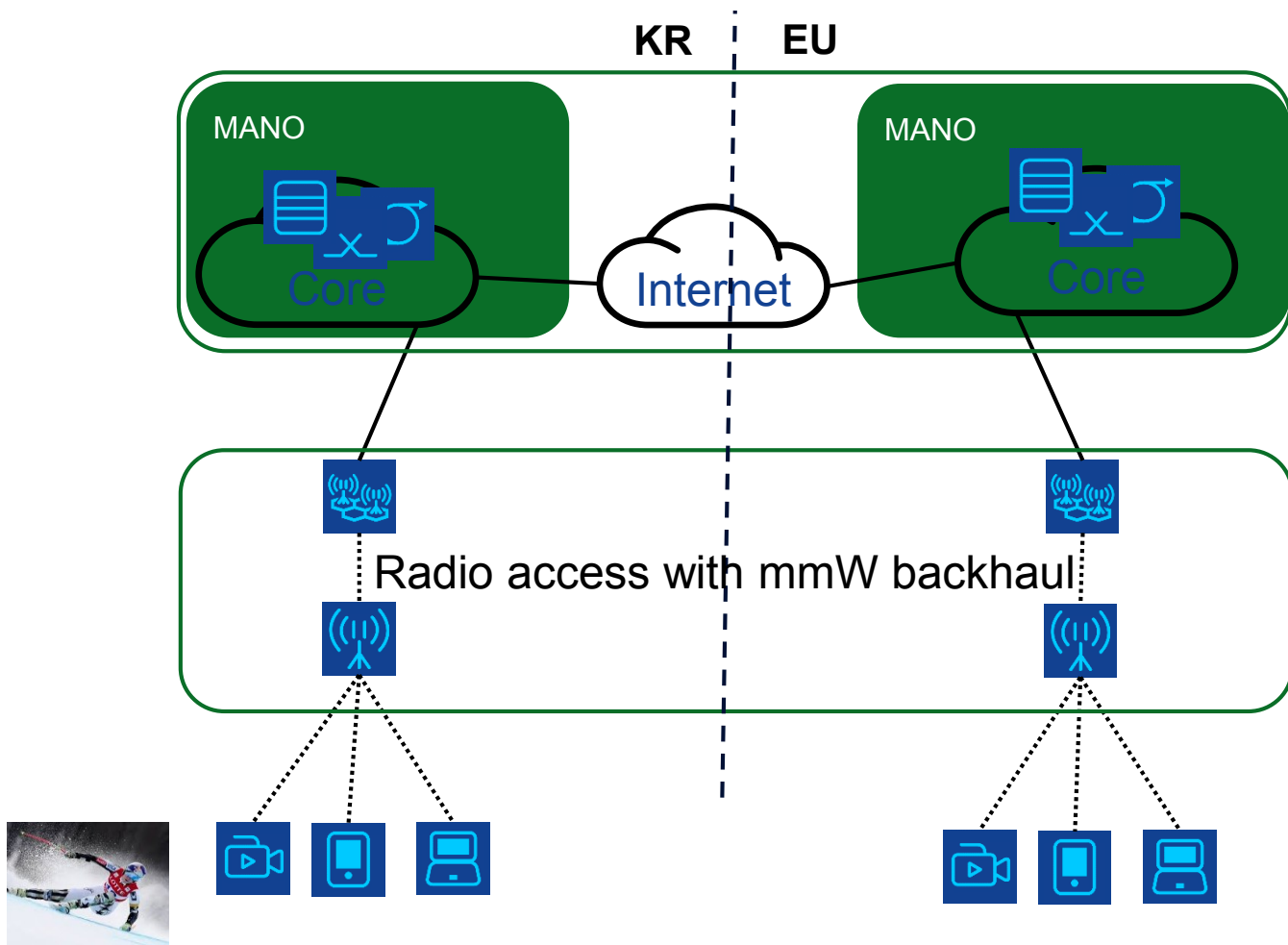
Tampere:  
 • Nokia

# Korean Mobile Core Deployment in 5G Champion

- Three Mobile Core PoPs for 5GCHAMPION
- Integrated Platform with infrastructure and vEPC
  - Daejeon: For interconnection test during whole period
  - Seoul: For domestic interconnection test via KOREN
  - GangNeung: For Olympic PoC and Demonstration

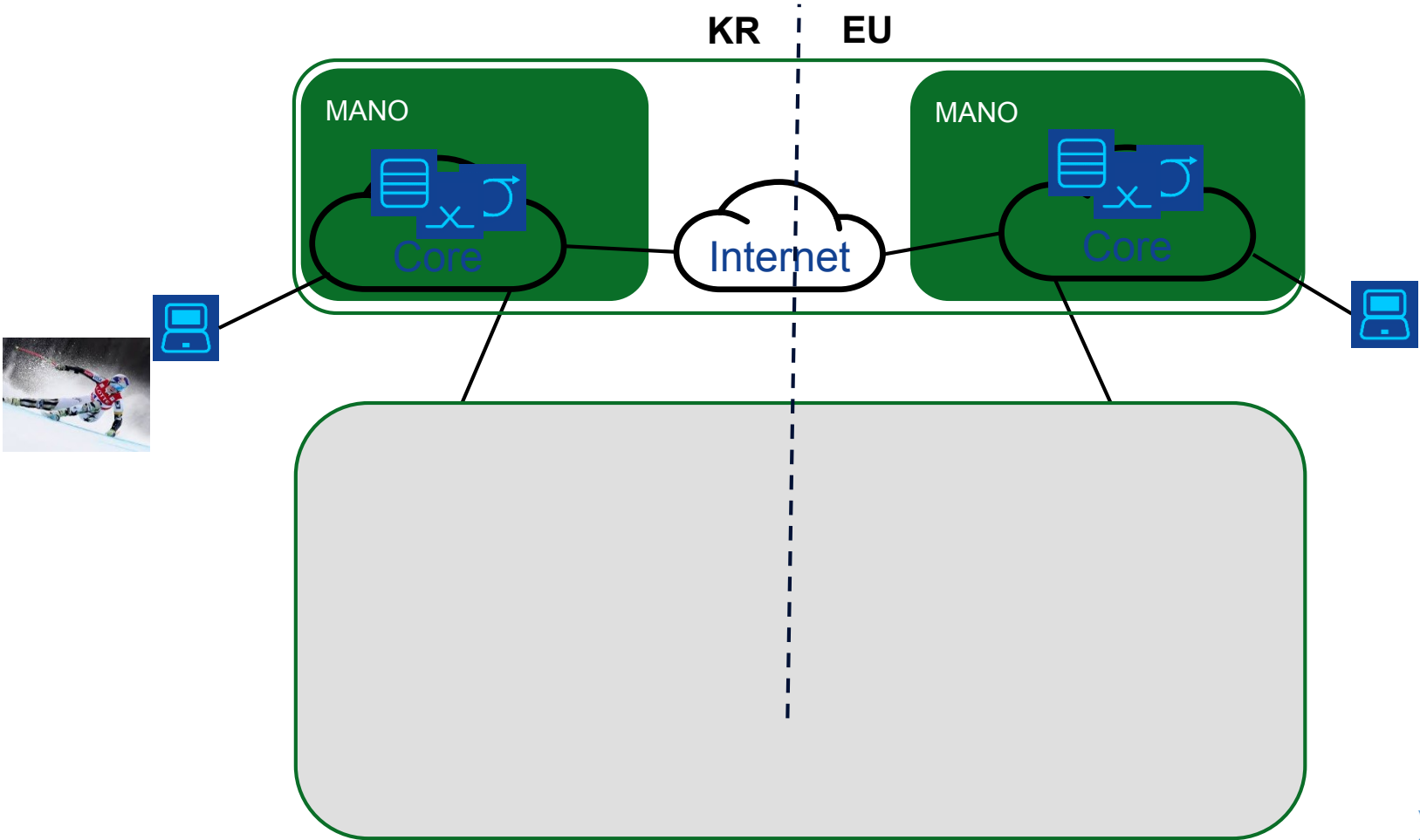


# Shared broadband applications use case – P2P video sharing in final 5GCHAMPION network





# Shared broadband applications use case – testing the interconnect with P2P video sharing in June 2017



## Interim results

- **Interconnection performance between EU-KR core testbeds (Detailed information in WP6 D6.2)**
  - Latency (ping):
    - Dedicated connection: ~300 ms , <1 ms jitter
    - Public internet: 325 ms but varies
  - Bandwidth
    - UDP with jperf: 800 Mbit/s
    - TCP with jperf: 40 Mbit/s
- **Innovation / what's new**
  - Local 5G capable test networks in EU and Korea supporting 5G bandwidth and latency needs
  - Virtualized Core network deployment in EU and Korea with the interoperability support
  - Long distance dedicated interconnection for 5G Champion usage (14000km) supporting 5G applications
- **Challenges**
  - Finding out the practical way to arrange the interconnect via FUNET, NORDUNET, GEANT, TEIN, KOREN



## Live demo

1. 4K Video streaming from Korea to Oulu (UOULU)
2. Realtime 4K 360° video streaming from Korea to Oulu (UOULU)
3. Performance testing of interconnect with Jperf, ping (UOULU)
4. **NFV/SDN Management and orchestration demo (KR)**
5. 5GTN NFV-based EPC deployment (UOULU)



**Thank you for your attention**

