TRIANGLE: an end-to-end testing ecosystem for 5G

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When I say “5G Testing”…

… what do you think about?

Yes! This is the one!
Do you speak Software-ese?

Let’s look at a domain that is getting closer: Software.

What are they testing?
- Unit testing
- Integration testing
- Component interface testing
- System testing
- Operational Acceptance testing

Extensive coverage of ALL the system
End-to-End Testing Ecosystem

**Transport**
- Deployment scenarios
- Carrier-grade SDN
- SLA/B2B services

**Services**
- Business Integrations
- Dynamic QoS
- Integrated vs CDN

**Mobile App**
- Live in-the-wild
- Connected behavior
- Device coverage

**5G TRIANGLE**

**Device**
- Power consumption
- Compliancy
- Chipset Performance

**EPC**
- Deployment configurations
- Network conditions
- Subscription levels

**RAN**
- New Waveforms
- RAN configuration
- Deployment scenarios

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Fitting specific interests

Pre-brewed configurations defined by TRIANGLE experts

TRIANGLE test bed
The Test Bed - Testing Possibilities

- Higher level scenario testing (e.g. crowded café, high speed train)
- Hardware testing (RF, power consumption)
- Capacity testing (call box)
- RAN configuration testing
- EPC stress test
- SDN algorithm and configuration test
- Transport or slice configuration test
- Service testing

Currently based on 4G and its evolution, expected final architecture
What is the benefit for MNOs

Manage “virtual” resources, adapt EPCs and slices to e.g. customer or service

Manage “physical” resources, guarantees service to EPCs

Example: Multi tenant transport
Who we are

The project
- “5G Applications and Devices Benchmarking” – TRIANGLE
- Co-funded by the Horizon 2020 Framework Program of the EU
- Started Jan-1\textsuperscript{st} 2016
- Expected duration of 3 years
- Six partners: 2 Industrial, 2 SMEs, 2 Academia

The EU Framework
- Horizon 2020 is a financing scheme for supporting European research.
- 5G-PPP Projects are financed under the same umbrella.
- FIRE is a branch of the program financing massive test bed activities.
Project Partners

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 688712
Wishlist

▲ Is E2E testing a valid approach that can be absorbed by the telco industry?

▲ What would you, especially MNOs, require from a 5G certification process?

▲ What would convince companies to use the test bed service?
   ▪ Device manufactures?
   ▪ Network Operators?
   ▪ Network Vendors?

▲ Which 5G forward leaning features should we implement to be more attractive?

▲ If it was a commercial Test-as-a-Service (TaaS), would it be a piece to include in your business model?
COME OUT AND PLAAYYY!