

# RELIABLE MULTICAST DELIVERY IN 5G NETWORKS



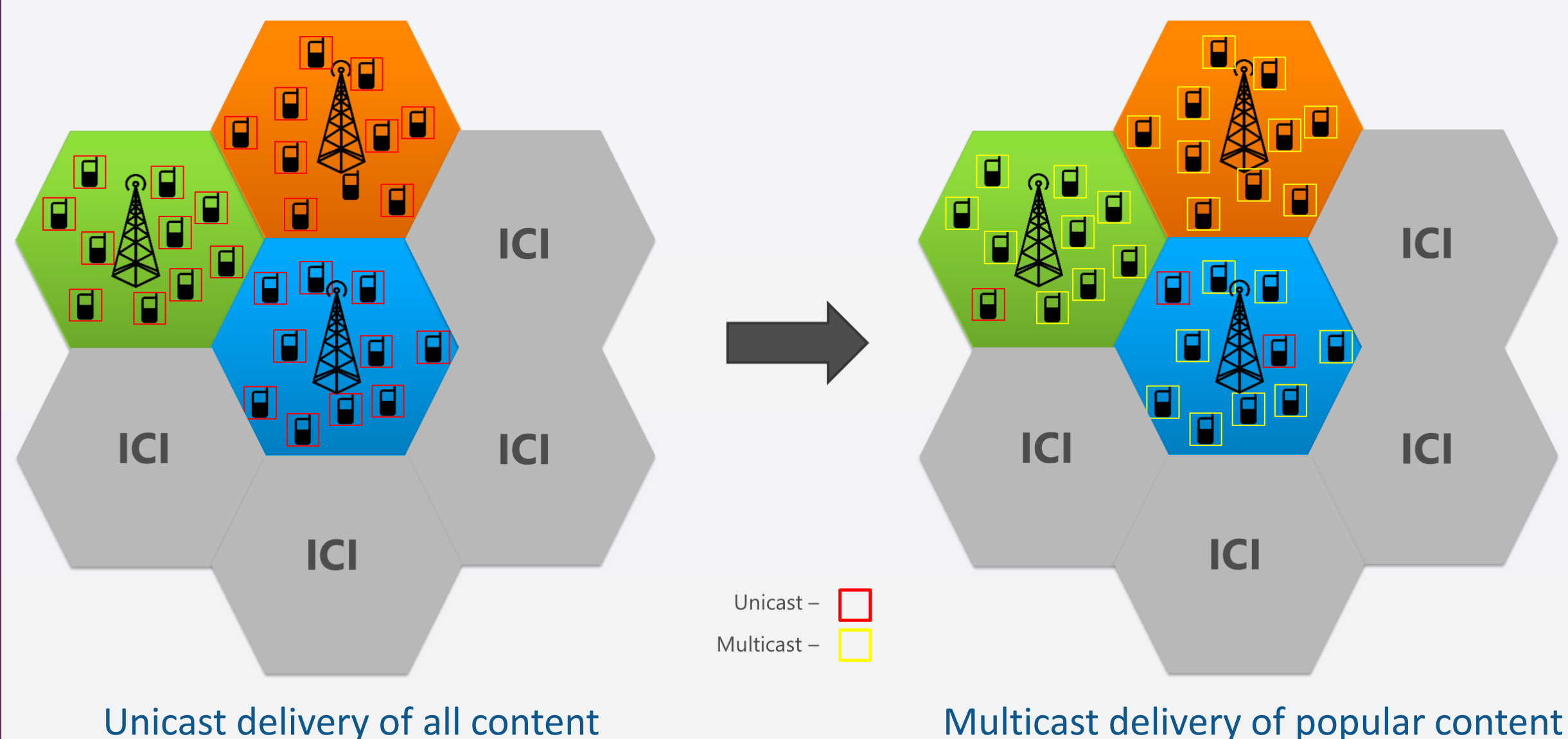
## OBJECTIVES

- ❖ To show the gains and trade-offs of using multicast against unicast for delivering popular content
- ❖ To show the improvements in the trade-offs achieved by multilink-enhanced multicast delivery

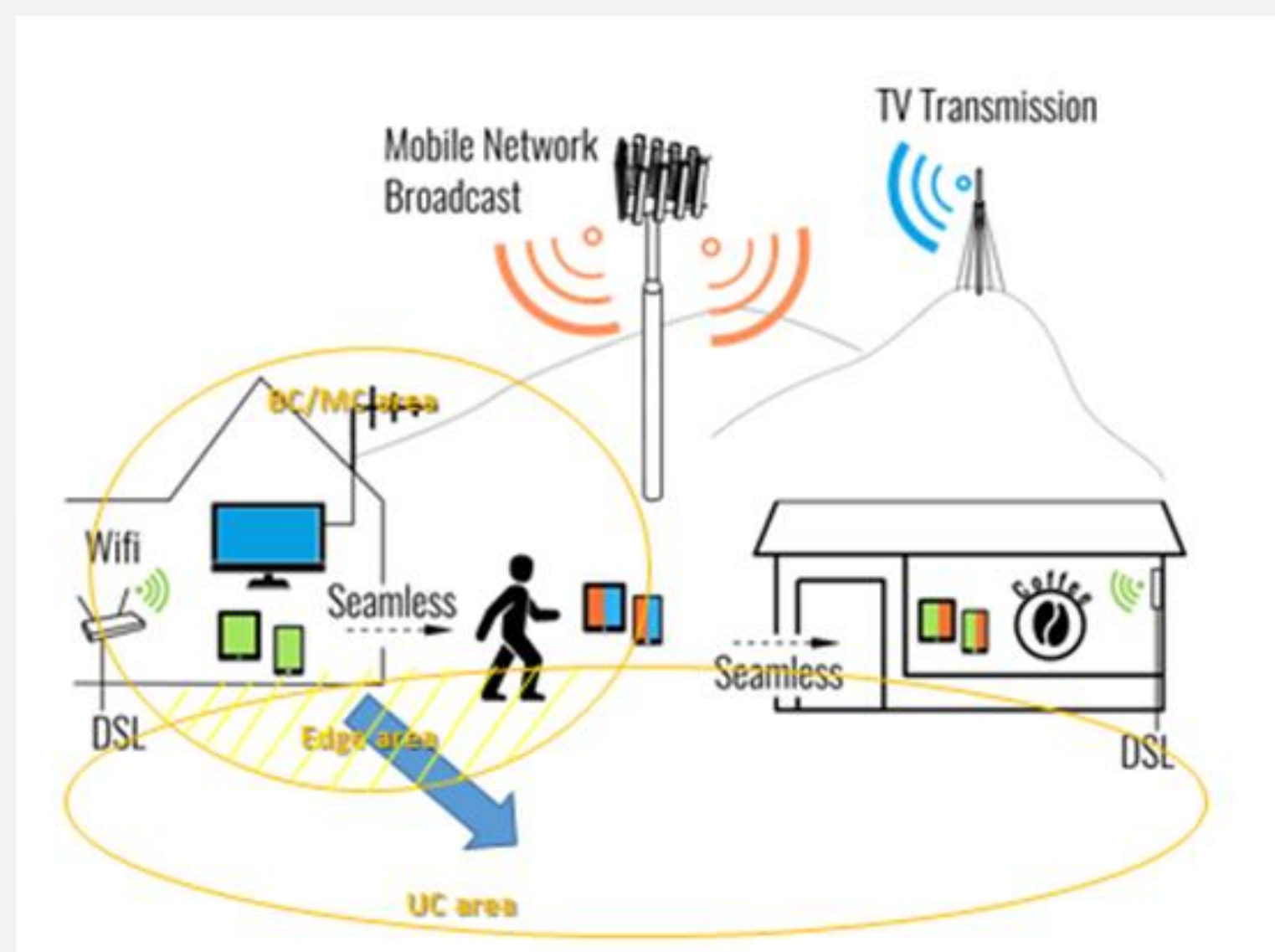
## CONCEPT

- ❖ Use of **multicast** mode of delivery for popular content streaming.
- ❖ Investigating effects of application-layer intelligence techniques
  - ❖ Multilink technology
  - ❖ DASH streaming
- ❖ Observing the improvements in
  - ❖ Resource consumption
  - ❖ Spectrum efficiency
  - ❖ Service coverage
  - ❖ Quality of Experience (QoE)

### 1. Multicast vs. Unicast



### 2. Multilink-Enhanced Multicast



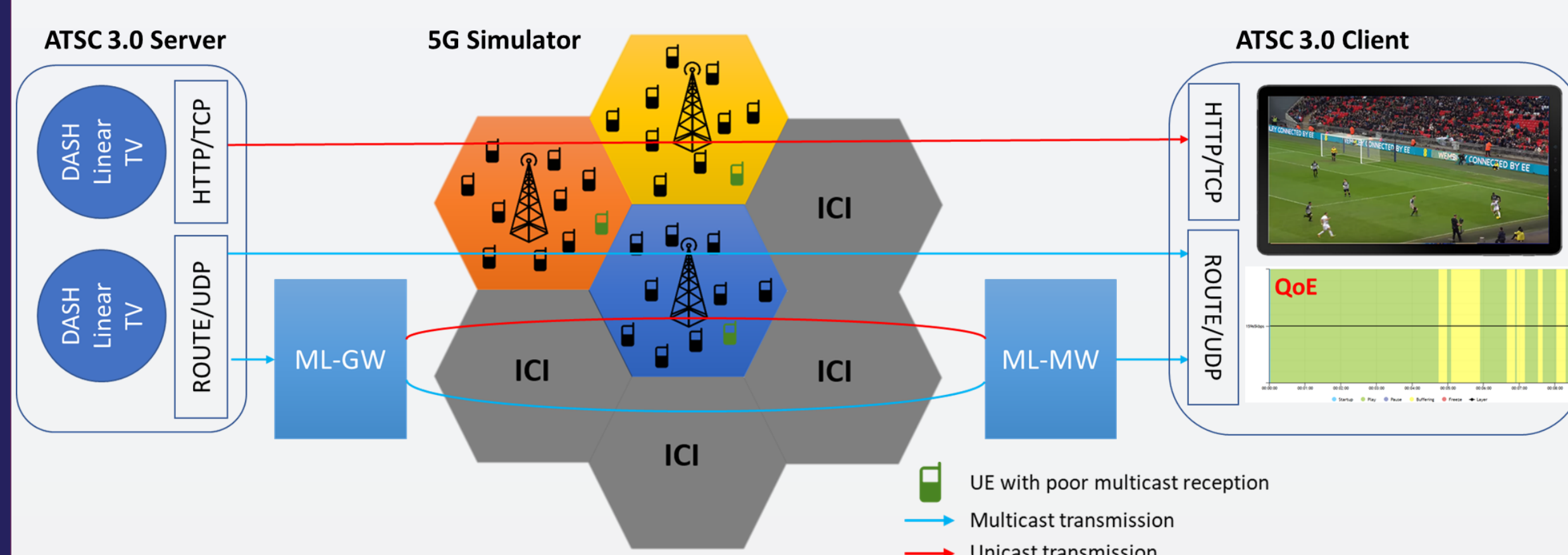
Multilink by means of multicast session packet duplication onto unicast

## Nomor Research System-Level Simulator

- **Real-time simulation platform (pure software)**
  - ✓ Multi-cell, Multi-user
  - ✓ Accurate PHY/MAC models
- ... + **Real application (live or synthetic)**
  - ✓ Streaming, web browsing, gaming, VoIP, MMS, etc.
  - ✓ E2E radio protocol stacks implemented
- ... + **Online visualization / Offline evaluation**
  - ✓ With „hot“ access to system parameters
  - ✓ Numerous quantities can be traced
- ... + **NR features**
  - ✓ cm-wave and mm-wave frequency ranges
  - ✓ TR38.901 channel model and scenarios + real-world scenarios
  - ✓ Alignment with 3GPP Rel 15

## FRAMEWORK

- ❖ The demonstrator consists of:
  - ❖ 5G network simulator
  - ❖ ATSC 3.0 Services Layer over 5G simulator
  - ❖ Forward proxy
  - ❖ DASH streaming
  - ❖ Multilink technology
  - ❖ QoE monitoring through QoE Analytics Server and 5G simulator GUI



## ECOSYSTEM

- NOM** provide 5G system-level simulator with real-time network KPI monitoring GUI.
- BLB** provide a simplified version of their Multilink solution to be integrated into the 5G simulator.
- BPK** provide real-time QoE monitoring system by their QoE Analytics Server and QoE SmartLib Player Library.
- BT** provide the original content from 2018 Wembley Cup Final.

## CONCLUSIONS

- This demonstrator shows the reliable multicast delivery in 5G networks and its benefits.
- ❖ Multicast delivery mode in the RAN can be used as a networks resource usage optimization for popular content distribution.
  - ❖ Multilink technology reduces resource usage while maintaining reliability of the service delivery and user experience.
- Future work could include the investigating the effects of e.g. different multilink algorithms and different technologies on the RAN efficiency and QoE.

## PROJECT INFORMATION

- **Duration:** 24 months
- **Collaborators:** Nomor Research, BundlesLab, Broadpeak, British Telecom
- **Website:** [www.5gxcast.eu](http://www.5gxcast.eu)
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