Taming Mobility Management Functions in 5G: Handover Functionality as a Service (FaaS)

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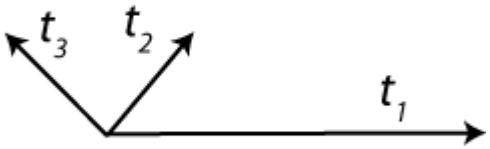
In a nutshell …

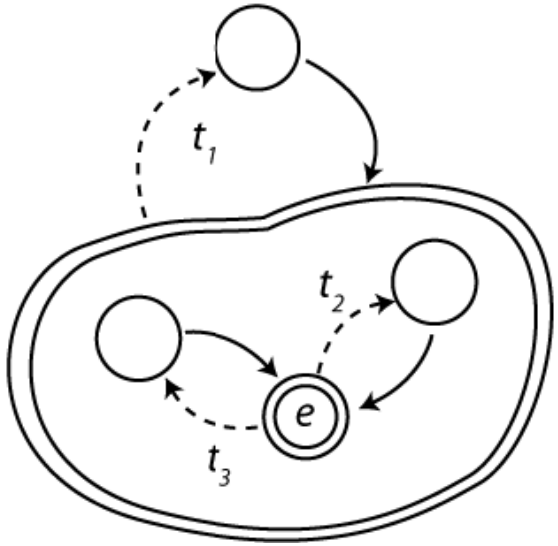
Modelling topology of mobile networks similar to the fixed network

Topology of Mobile Devices → dynamic graph

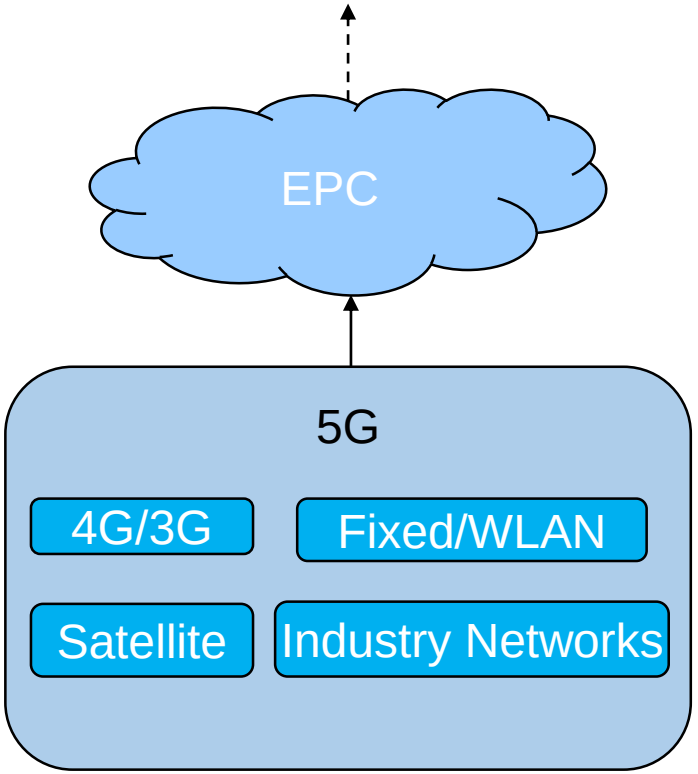
Abstract view of topology→ available at the top-level controller

Measuring signal quality→ identifying graph dynamics





One common network



- ✓ Service/User centric
- ✓ Optimized usage of resources
- ✓ Full integration
- ✓ Smart and smooth access network selection

Of technologies and infrastructure

Convergence

Devices are powerful and can act autonomously

Autonomy

Predictability

Mobility management as a Service

Self-regulatory networks

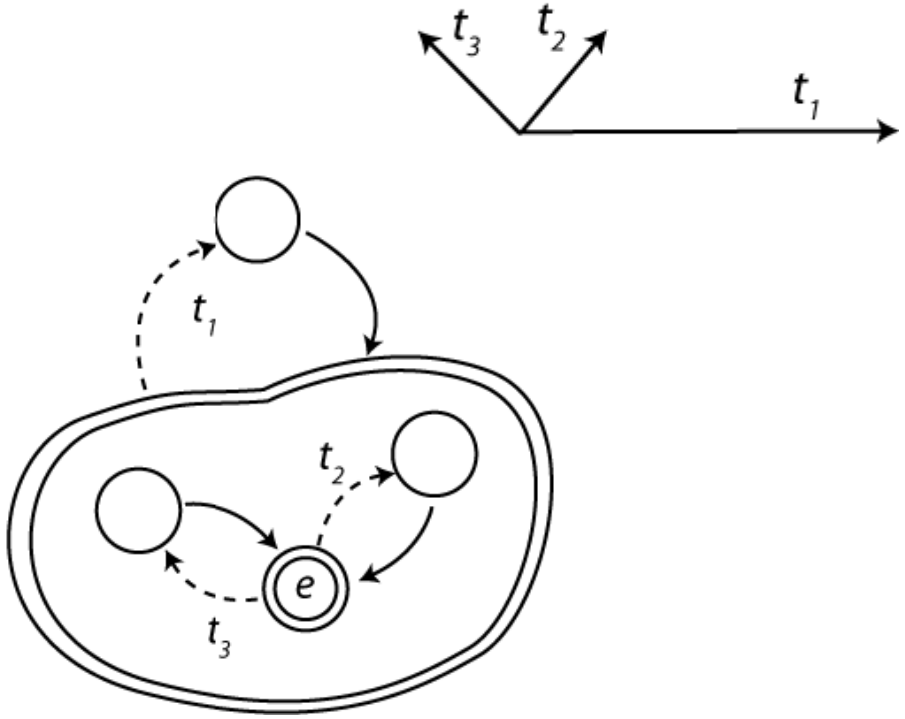
Topology of Mobile Devices → dynamic graph

↓

Abstract view of the topology available at the top-level controller

↓

Measuring signal quality & Predicting mobility → identifying graph dynamics



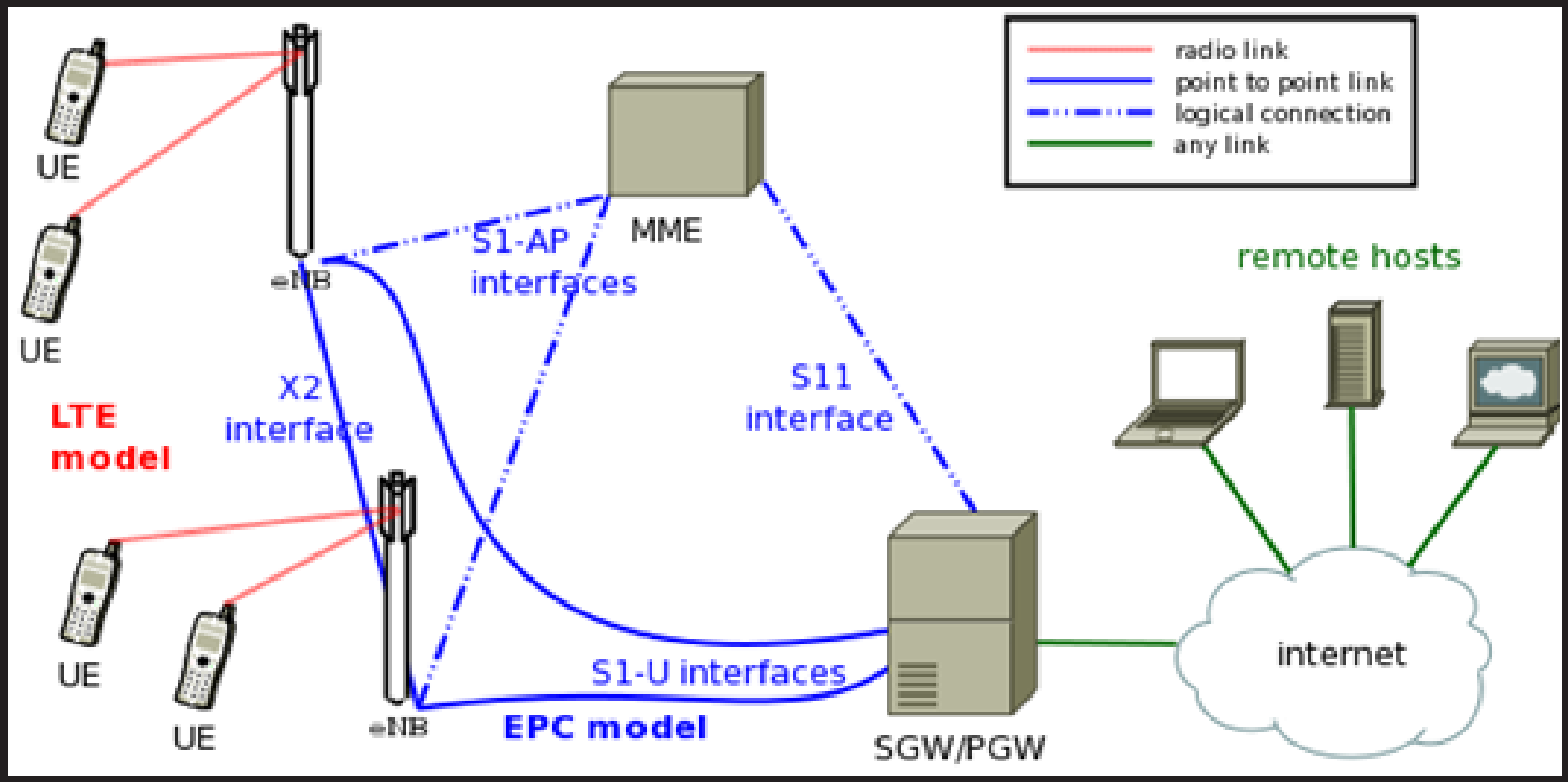
Controller might decide to reconstruct the topology i.e., trigger a handover.

Mobility & Handover

- Topology of the mobile network is modeled as a graph assuming each UE is connected to only one eNodeB at any time instant.
  - This graphical representation is evolving with time and therefore, it is obtained by iteratively applying some given operator on the initial graph.
- Initial graph $X = \{E, V\}$ Operator T
- Dynamic nature of graph is expressed by (X, T), where $T:X \rightarrow X$ recursively.

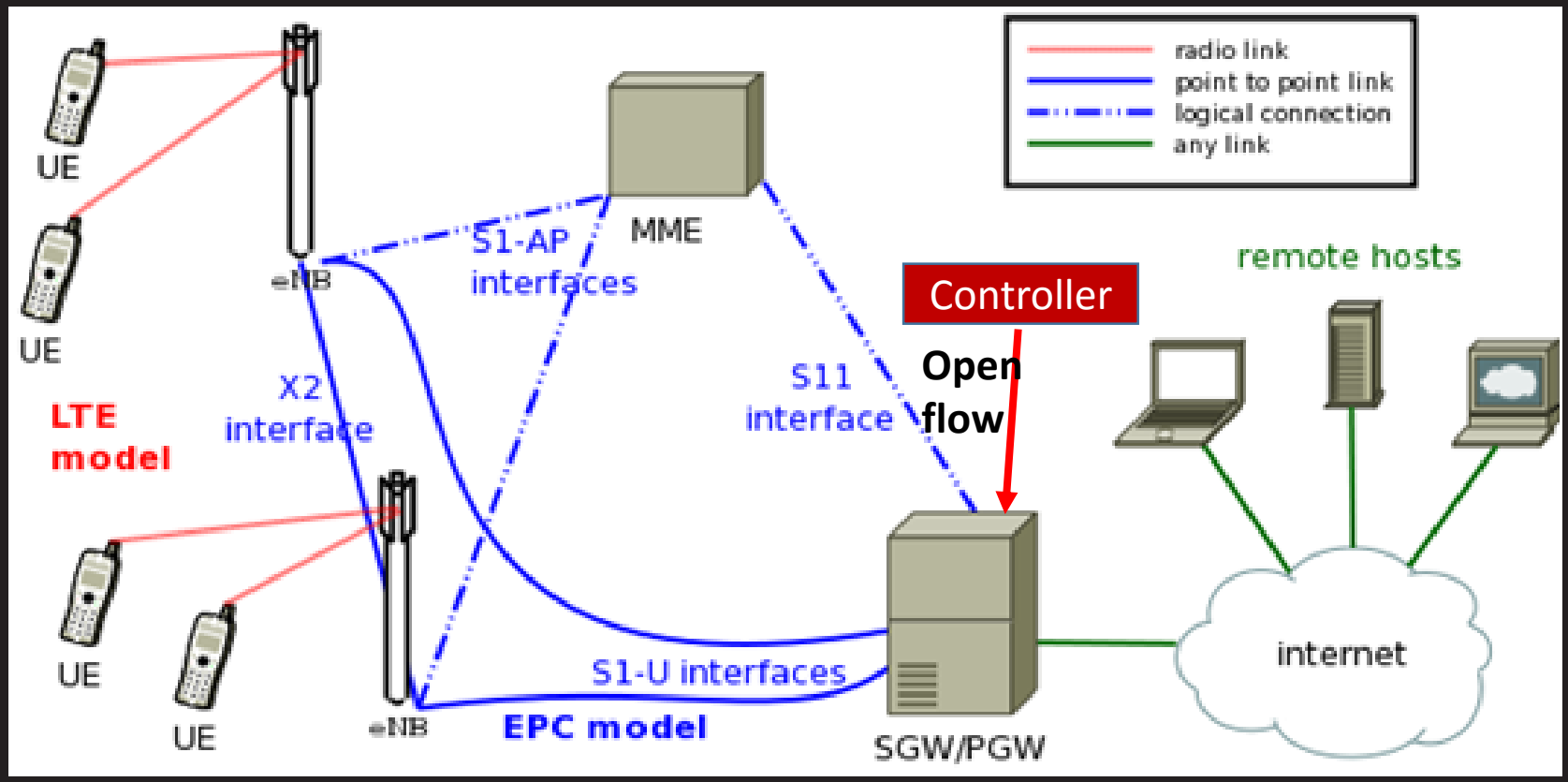
- Operator T is triggered based on UE's measurement of the received signal level from eNodeB.
  - The existing periodical UE reporting is used.
- Operator T is defined by thresholding the measurements.

Simulation Model

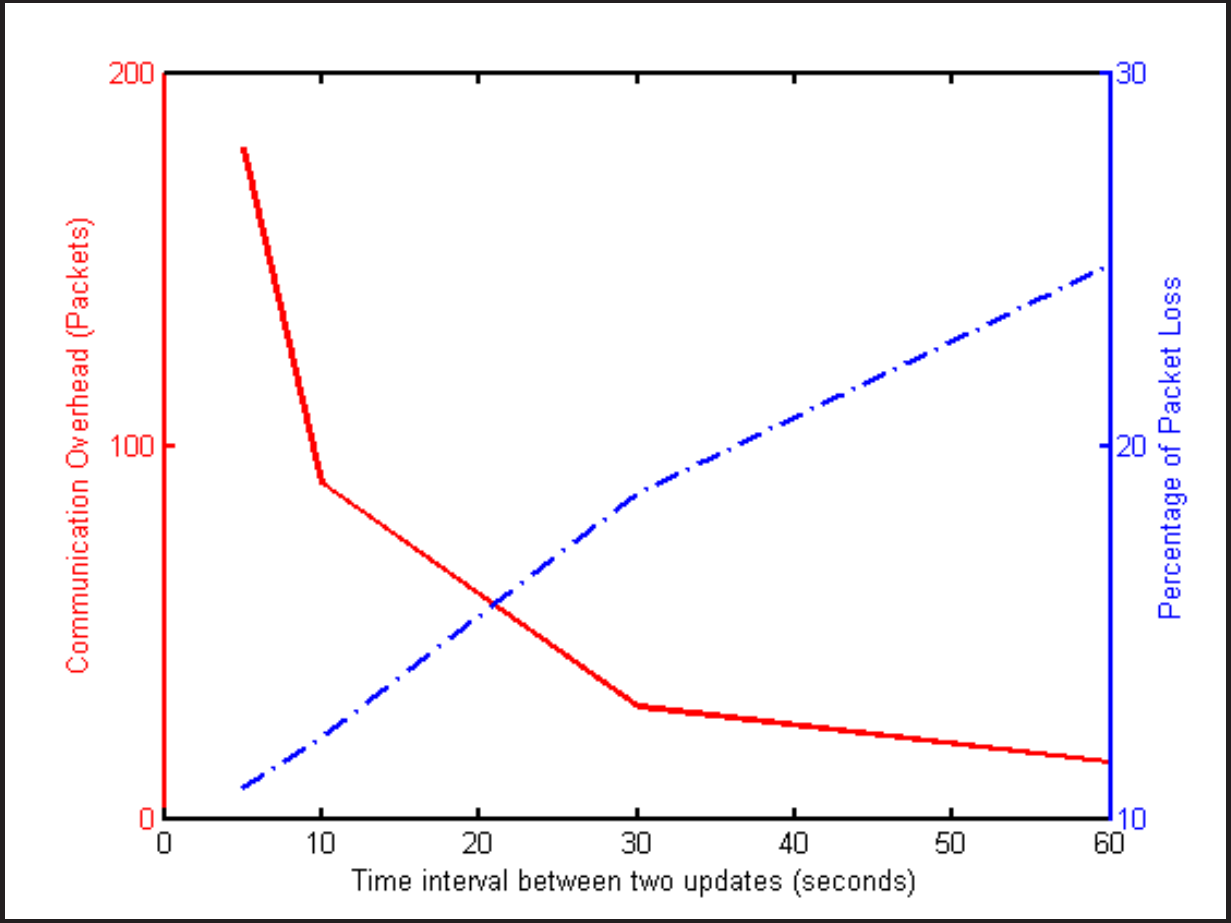


G. Piro, N. Baldo, and M. Miozzo, "An LTEmodule for the ns-3 network simulator," in Proc. of the 4th International ICST Conference on Simulation Tools and Techniques, pp. 415–422, 2011.

Simulation Model



How often to update



Further considerations

- Prediction of mobility patterns.
  - Self-regulatory and self-governed graphs.
  - Inclusion of analytics, in identifying the pattern.
- Replacing the frequent update of UE signal level, with an event-based update.
- The actual routing protocol.

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http://www.ctr.kcl.ac.uk/Toktam/index.htm