Recent EPS Implementations Using ns-3

**Workshop on Simulation and Prototyping Environments for Mobile/Wireless Research
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Simulation Capabilities and Possibilities of ns-3

What is ns-3?

- ns-3 is discrete event based network simulator for IP-based systems

- Open source project

- Not backwards compatible with ns-2

- Developed from scratch

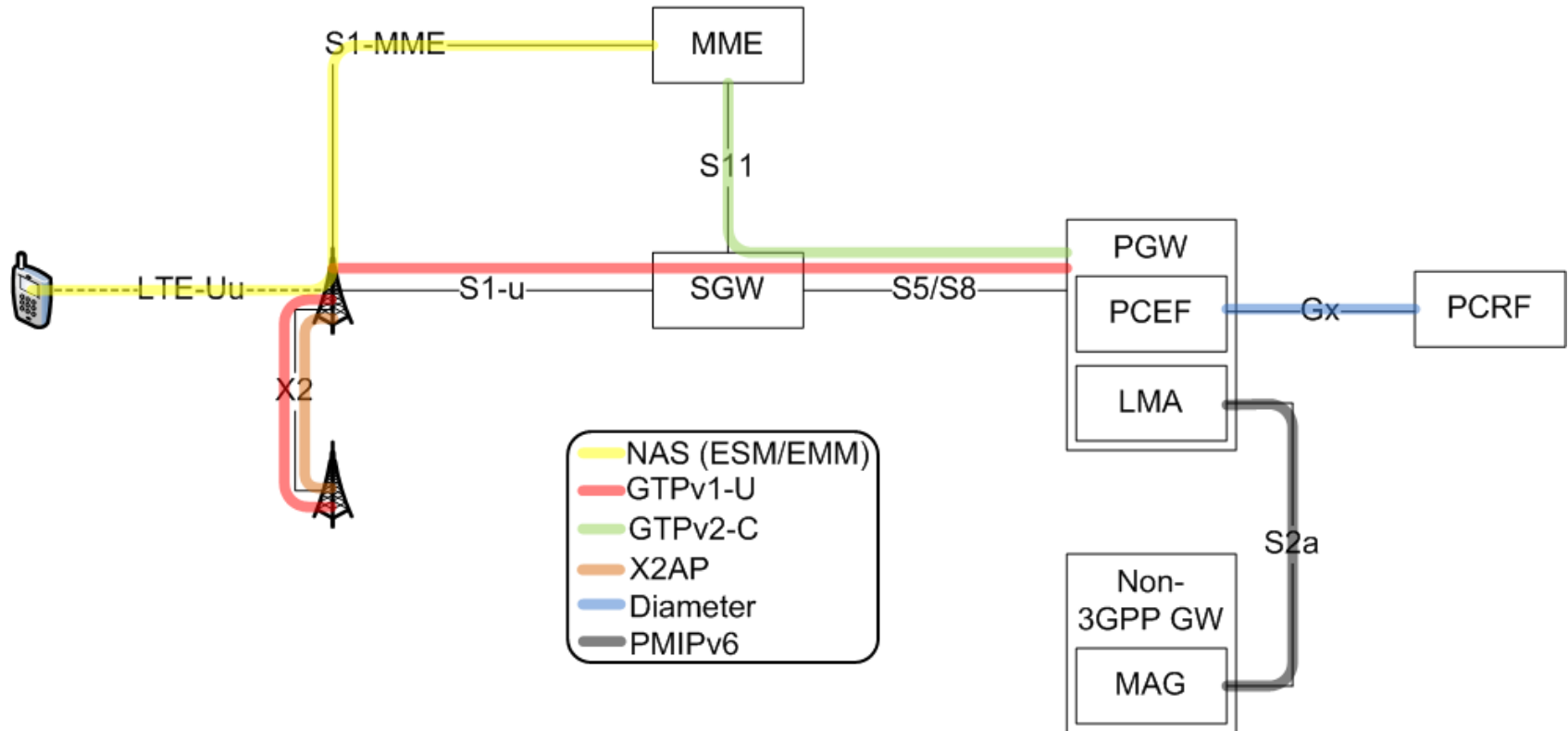- Programming language: C++, (Python is optionally available)

Simulation Capabilities and Possibilities of ns-3

The main advantages compared to ns-2

- The ability of doing emulations with ns-3. ns-3 can send/receive data traffic to/from real networks or other virtual machines.
  - Ns-3 implementations align with real systems like sockets, devices and driver interfaces

- Porting source code from a former to a new release can be done much easier than it is with ns-2.
  - This is a result of the decoupled, modular software architecture from ns-3

- Feasible integration of new modules

- Protocol implementations can be done close to a bit-by-bit implementation.
  - This enables the generation of pcap files, which can be read by tracing tools (e.g. Wireshark)

Recent EPS Implementations using ns-3

Focus of our recent EPS implementations:

Experiences gained with ns-3

- Close to reality protocol stack
  - Enables the generation of pcap files.
  - Enables validations against reference systems like Wireshark.
  - Gain a certainty that the implementations are conform with the standards.
- Possibility of emulations

  Example of an emulation is the PMIPv6 emulation

  Get a subjective impression of the handover quality
  - IPv6 radio stream server is the Correspondent Node (CN)
  - Virtual Machine is the Mobile Node (MN)
  - Application, running on the Host, forwards the IPv6 radio stream to the MN via the ns-3

Further Development Plans

Short-term goal:

- Enable EPS protocol implementations, which most are stand alone building blocks, to interwork with each other.

- Extending the existing protocols with useful use cases.

Mid-term goal:

- New protocol implementations (a candidate is the IEEE defined Media Independent Handover (MIH))

- Extend existing protocol implementations to enable inter-system handovers.

Conclusion

- Due to the close to reality implementations we expect to gain comparable simulation results.

- ns-3 implementations can interwork with real world devices or also other simulation environments.

- The possibilities of ns-3 are impressive and the more protocols are implemented the more comprehensive and precise simulation results can be gained.

Thank you

Questions?