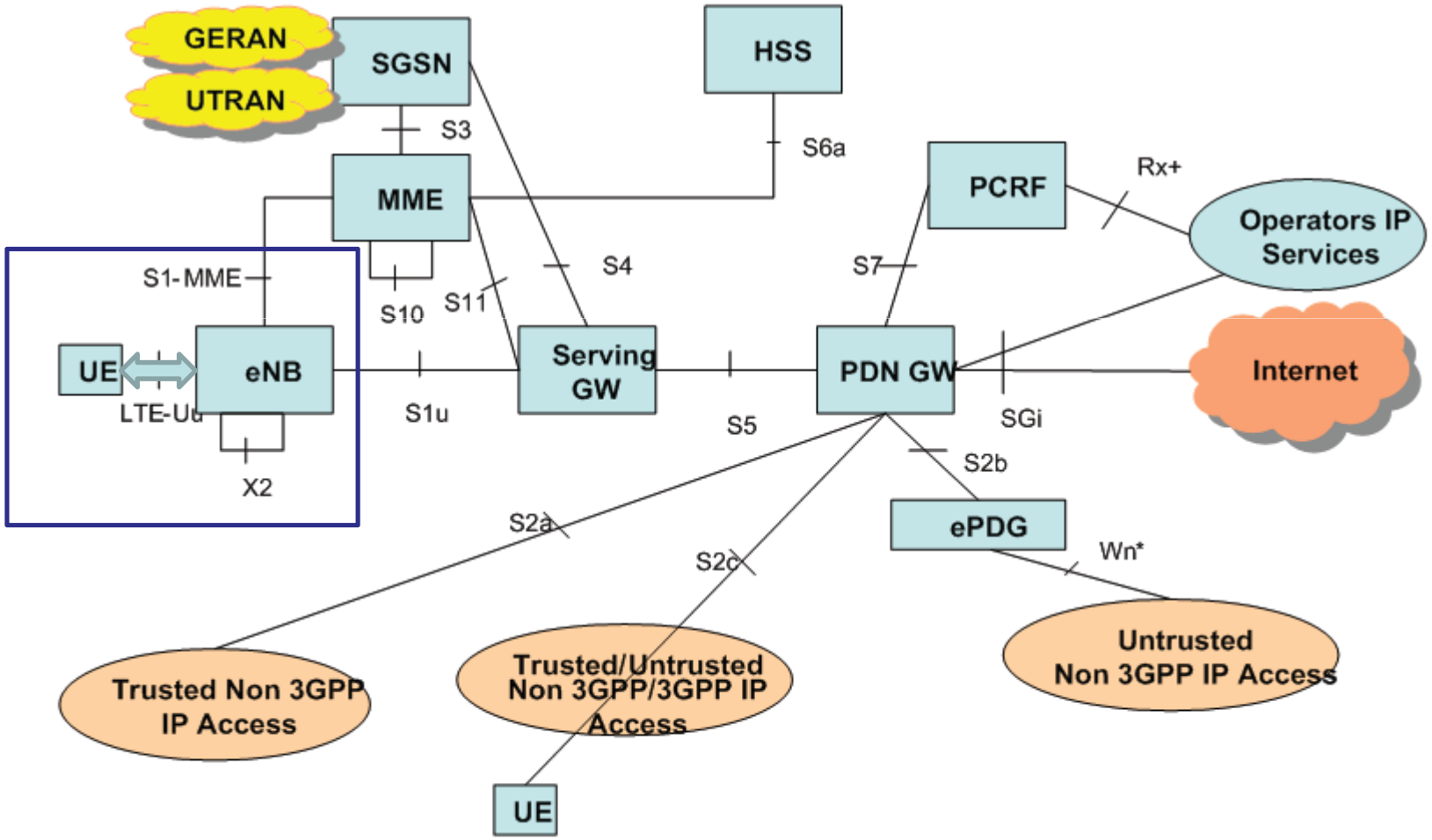
Testing Technologies

Long Term Evolution - LTE

A short overview

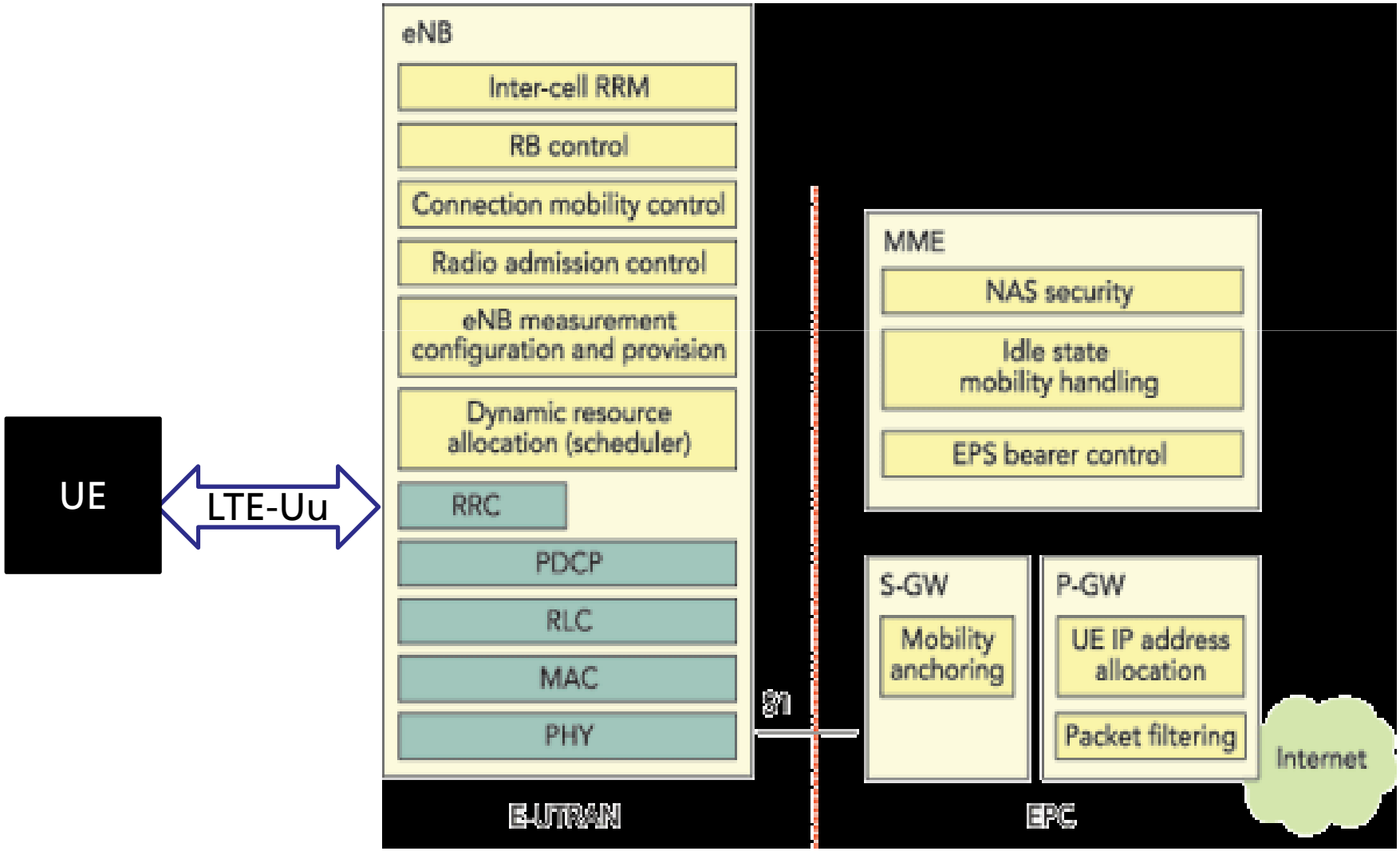
LTE Architecture



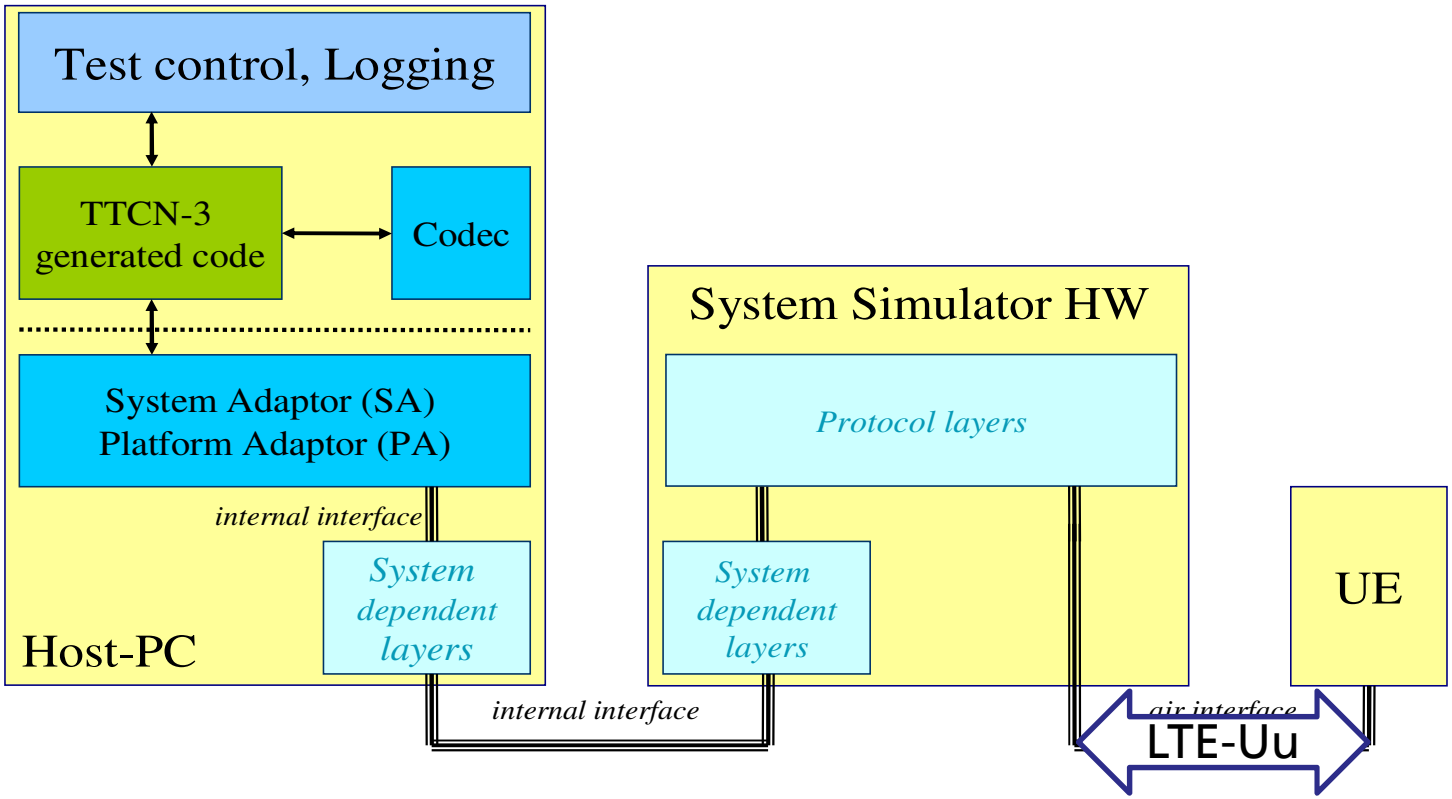
Conformance Test Suite Specification

- 3 GPP and ETSI product
- 3GPP TS 32.523-3
  - Evolved Universal Terrestrial Radio Access (E-UTRA)
  - User Equipment (UE)
- Protocols
  - Radio Resource Control Protocol (RRC)
  - NAS security (UE <-> MME)
  - S1-MME (E-UTRAN <-> MME)

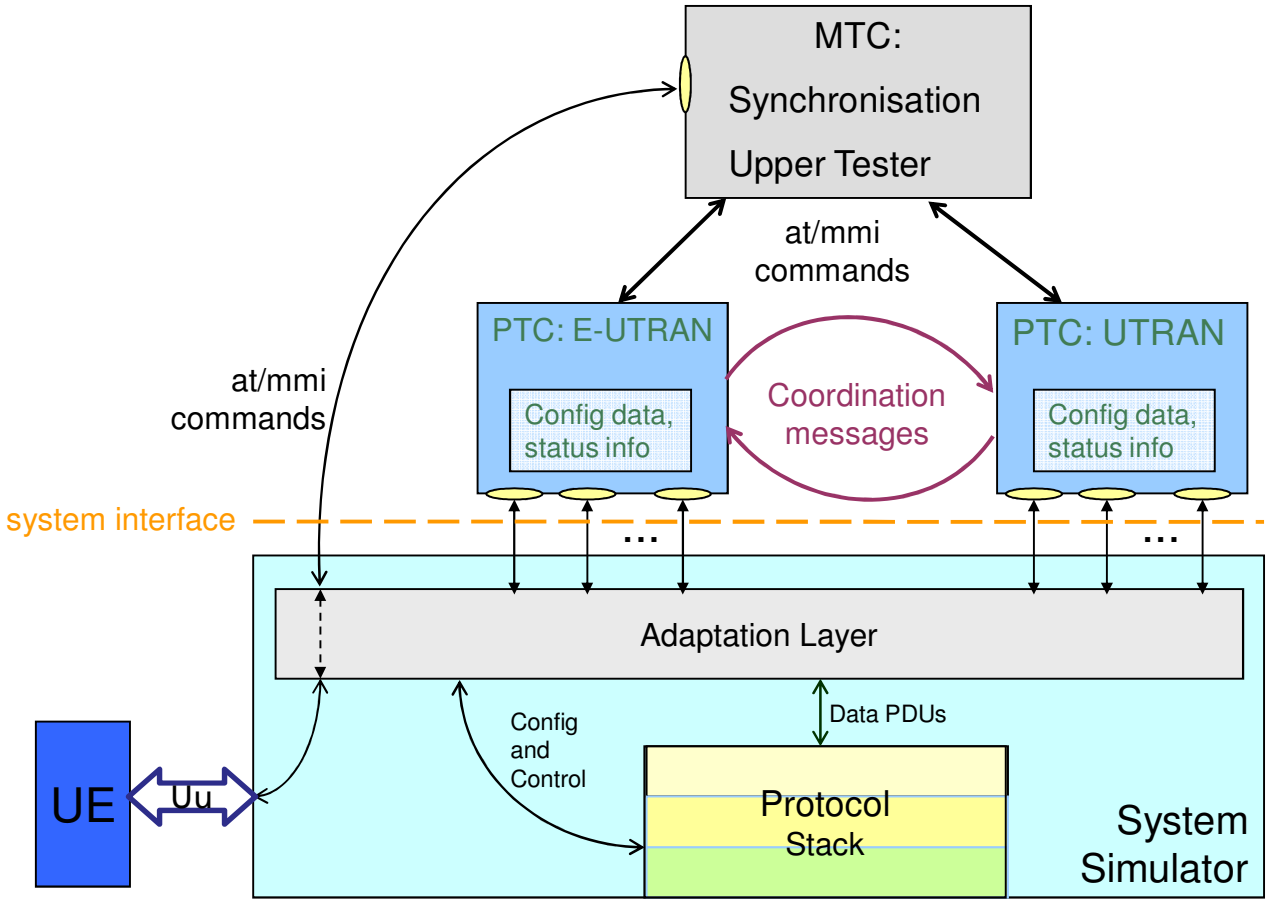
LTE Architecture in Detail



Test system architecture E-UTRAN/UE



Test Architecture (2)



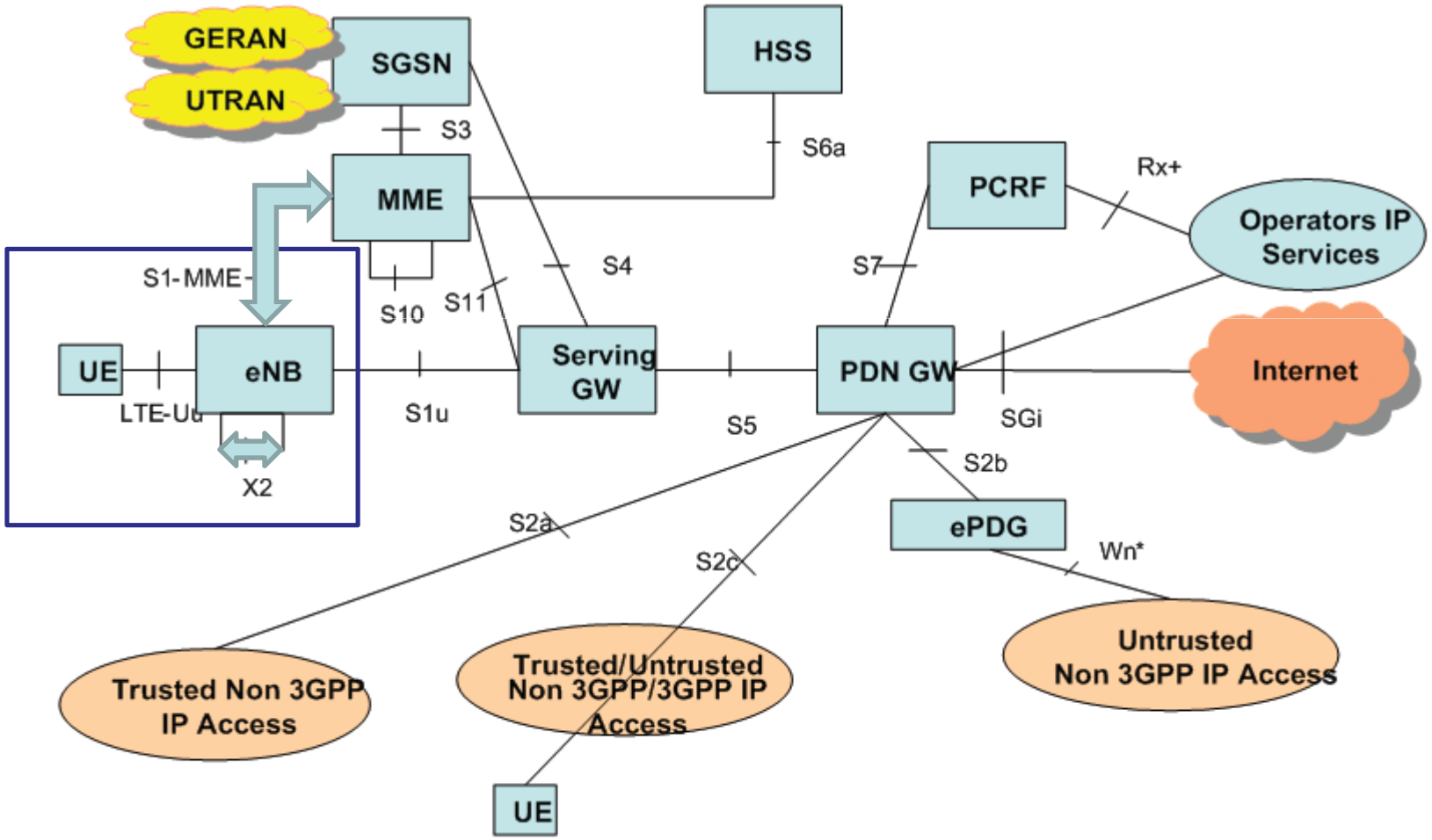
LTE Test Suite Features

- Full-featured tests for
  - Radio Resource Control Protocol (RRC)
    - TS 36.331 v 8.1.0 (2008-03)
  - UE <-> E- UTRAN
- Ready for E – UTRAN / UTRAN / GSM
- Exhaustive set of context parameters
  - For flexible adaptation of LTE tests to the UE (implementation under test)
  - PDCP/RLC/MAC configurations triggered by TTCN-3

LTE Test Suite Features (2)

- Fully automated test execution
- Platform-independent test execution
  - Executable tests can be ported onto various test devices and test platforms
- Test tracing on different levels of detail
- Summary of test results
- Test definition and documentation
  - In the standardized test notation TTCN-3

LTE Architecture



Additional Codec Plugin Support

- RRC (included in the test suite)
  - UE <-> E- UTRAN
  - ASN.1 Codec generation
- S1 Application Protocol
  - E Note B <-> MME Mobility Management Entity
  - TS 36.413 v 810 (2008-03)
  - Type System and ASN.1 Codec generation
  - TA SCTP Plugin
- X2 Application Protocol
  - E-UTRAN Note B <-> E-UTRAN Note B
  - TS 36.423 v 810 (2008-03)
  - TA SCTP Plugin

Extending the LTE Test Suite

- Adding new test cases
  - As easy as writing TTCN-3
- Adding new test configurations
  - Use TTCN-3 component and configuration features
- Extensibility
  - Additional LTE Features
  - New and all upcoming features for LTE

Abbreviation

- **3GPP**: 3rd Generation Partnership Project
- **ARQ:** automatic repeat request
- **eNB:** E-UTRAN NodeB base station
- **EPC:** evolved packet core
- **E-UTRAN:** evolved UMTS terrestrial radio access network
- **LLAPI:** low-level application programming interface
- **LTE:** long term evolution
- **MAC:** medium access control
- **MLAPI:** medium-level application programming interface
- **MME:** mobility management entity
- **NAS:** non-access stratum
- **PDCP:** packet data convergence protocol
- **PDN:** packet data network
- **RLC:** radio link control
- **P-GW:** PDN gateway
- **RB:** radio bearer
- **RRC:** radio resource control
- **RRM** :radio resource management
- **S-GW:** serving gateway
- **UE:** user equipment
- **UMTS:** Universal Mobile Telecommunications System