

# LTE Solutions

## S1 & X2 Protocol Stacks

The OSS LTE S1 and X2 protocol stacks are implemented as flexible combinations of several layers that allow the development of different types of LTE-based client and server applications.

The stack layers include:

### S1/X2 ASN.1 Layer API

- message construction and validation
- encoding and decoding

### S1/X2 Dispatcher API

- blocking and asynchronous S1/X2 calls
- timeout handling
- request and response matching (S1/X2 server side processing)

### SCTP Transport Layer

- sending and receiving messages

The ASN.1 Layer API for LTE S1 and X2 protocols is currently available. The Dispatcher API, and Transport Layer, both optional, will be available in 3Q09.

The ASN.1 Layer API automates common application tasks associated with protocol messaging. It reduces development efforts by providing a set of functions that cover S1 and X2 data interpretation and construction tasks thereby shielding application developers from low-level message manipulation.

The API is available for the various OSS encoder/decoder libraries, each of which is optimized to meet your most important criteria – speed, rich diagnostic capabilities, or small footprint.

By offering flexible protocol stack solutions, OSS makes it possible to deploy LTE on different types of platforms such as resource constrained eNodeBs or high performance MMEs.

This OSS stack solution can easily be ported on any platform; the underlying OSS ASN.1/C encoder/decoder library is currently ported to more than 250 platforms.

## Strategic Benefits

- Reduce time to market
- Reduce product development and maintenance costs
- Increase your return on investment
- Boost your value proposition
- Gain an immediate edge over the competition

## Key Features

- Optimized for memory and performance
- Embedded platform support
- Comprehensive diagnostic and debug capabilities
- Interoperable
- Future proof design
- Proven ASN.1 CODEC
- 3GPP Release 8 compliant
- Porting, integration, and customization support

### LTE Client/Server Applications

S1/X2  
Dispatcher API

S1/X2  
ASN.1 Layer API

OSS ASN.1  
Encoder/Decoder

SCTP Transport Layer

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The OSS LTE S1/X2 ASN.1 Layer offers the following functionality:

- API to create Information Elements (IEs) from their constituting parts.
- API to create S1 and X2 PDUs (Protocol Data Units) for Initiating, Successful outcome, and Unsuccessful outcome messages. Different functions support the creation of PDUs either in one step (all the IEs are passed to the constructor function) or by the incremental addition of IEs to the PDU.
- API to encode, decode, compare, copy, and de-allocate S1 and X2 PDUs. The Decoding function can enforce post-decoding validation and report both Transfer Syntax and Abstract Syntax errors as specified in the 3GPP TS 36.413 and TS 36.423.
- API to obtain particular IEs from S1 and X2 PDUs.
- Standalone Abstract Syntax error validating API to automatically construct Cause and CriticalityDiagnostics information elements in case of Abstract Syntax errors.
- API to derive Successful and Unsuccessful outcome messages from Initiating messages (the matching IEs can be copied from the Initiating message to the outcome message).
- Utility functions include: library initialization and termination; customization of memory handling and printing facilities such as installing specialized dynamic memory handling and printing callbacks; API debugging level customization.

### Product Deliverables

- S1/X2 runtime libraries optimized for speed, size, and memory footprint
- ASN.1 PER encoder/decoder
- Sample programs
- HTML/PDF documentation
- 24x7 email/phone support
- Source code (optional)

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**Learn about our other OSS LTE Solutions**

**LTE-1Step** – easy to use, graphical testing and analysis tool

**LTE UE Protocol Stack** –

an implementation of Layer 2, Layer 3, and NAS optimized for the memory, power, and performance requirements of user devices

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