Author: Timo Pärnänen

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SCCP

The sccp module implements the ITU-T Recommendation Q.711-714 (Signalling System No. 7 - Signalling Connection Control Part). The SCCP provides additional functions to the MTP to support both connectionless and connection-oriented network services between SS7 (Signalling System No.7) nodes.

1 Introduction

Connectionless implementations of SCCP are more common than connection-oriented implementations. This is valid also in TOVE project so that only connectionless services are implemented in this version. From now we discuss only connectionless services.

The SCCP provides the SCCP user (e.g. TCAP) with the ability to transfer signalling messages via the signalling network without setup of a signalling connection. Another major function of SCCP is address translation, which maps called address, such as dialed digits (Global Title) from TCAP, to the signalling point code of the MTP service.

2 Architecture

The figure 1 shows the architecture of SCCP specified in ITU-T Recommendations. Only the grayish area of the figure (connectionless and routing control) is implemented.

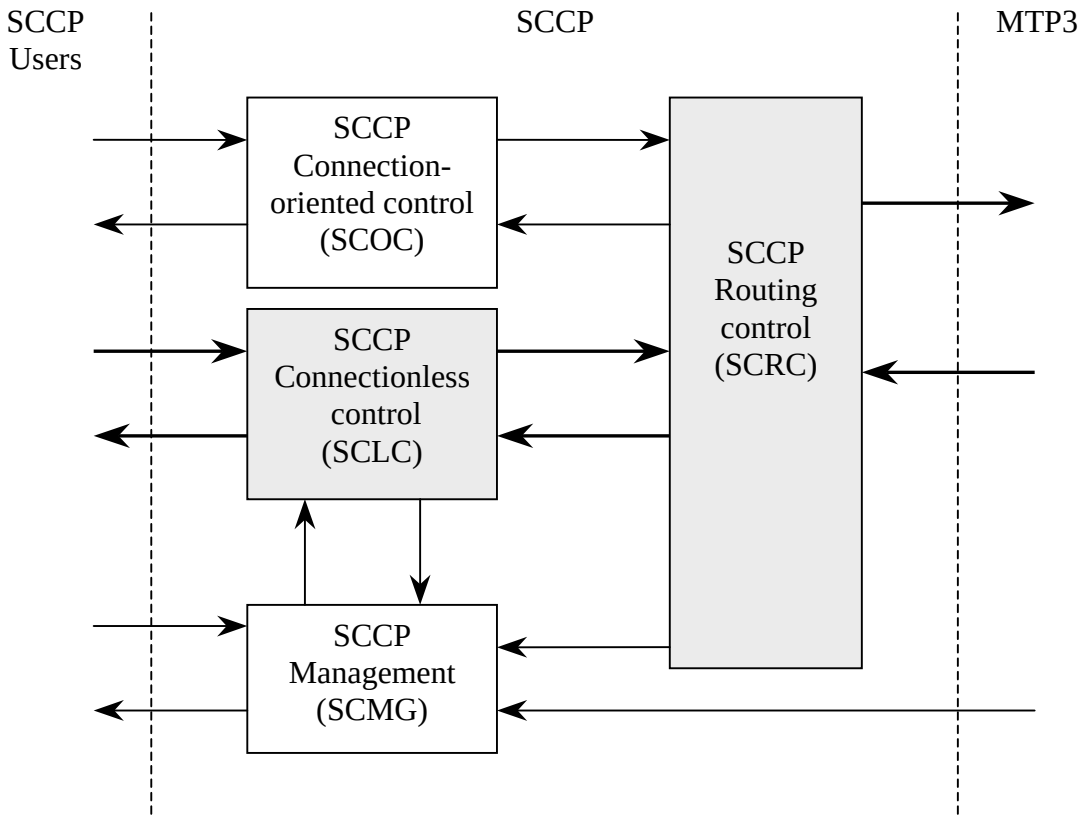

Figure 1. Architecture of the SCCP layer.

2.1 Modules and interfaces

The sccp module implements connectionless services of SCCP protocol. It uses the services of MTP3. The user layers rest on top of SCCP and rely on SCCP for a wide variety of services. The SCCP protocol uses ss7Configure object to provide address translation and routing.

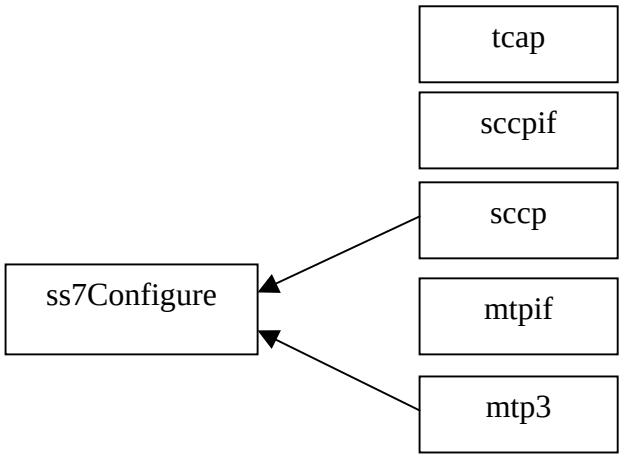

Figure 2. The upper and lower interfaces and modules used by sccp module.

Upper protocol:	tcapAdapter
Upper modules:	tcap
Upper interface:	sccpif
Module:	sccp
Lower interface:	mtpif
Lower module:	mtp3
Lower protocol:	mtp3Protocol
Uses:	ss7Configure

Table 1. Upper and lower interfaces and modules used with sccp module.

2.2 Class hierarchy

Implemented blocks, SCLC and SCRC, are protocols with own state machines. Blocks can have lots of interconnections. This is implemented using a Mediator pattern, which encapsulates how a set of objects interacts. The following figure shows a class hierarchy of the SCCP.

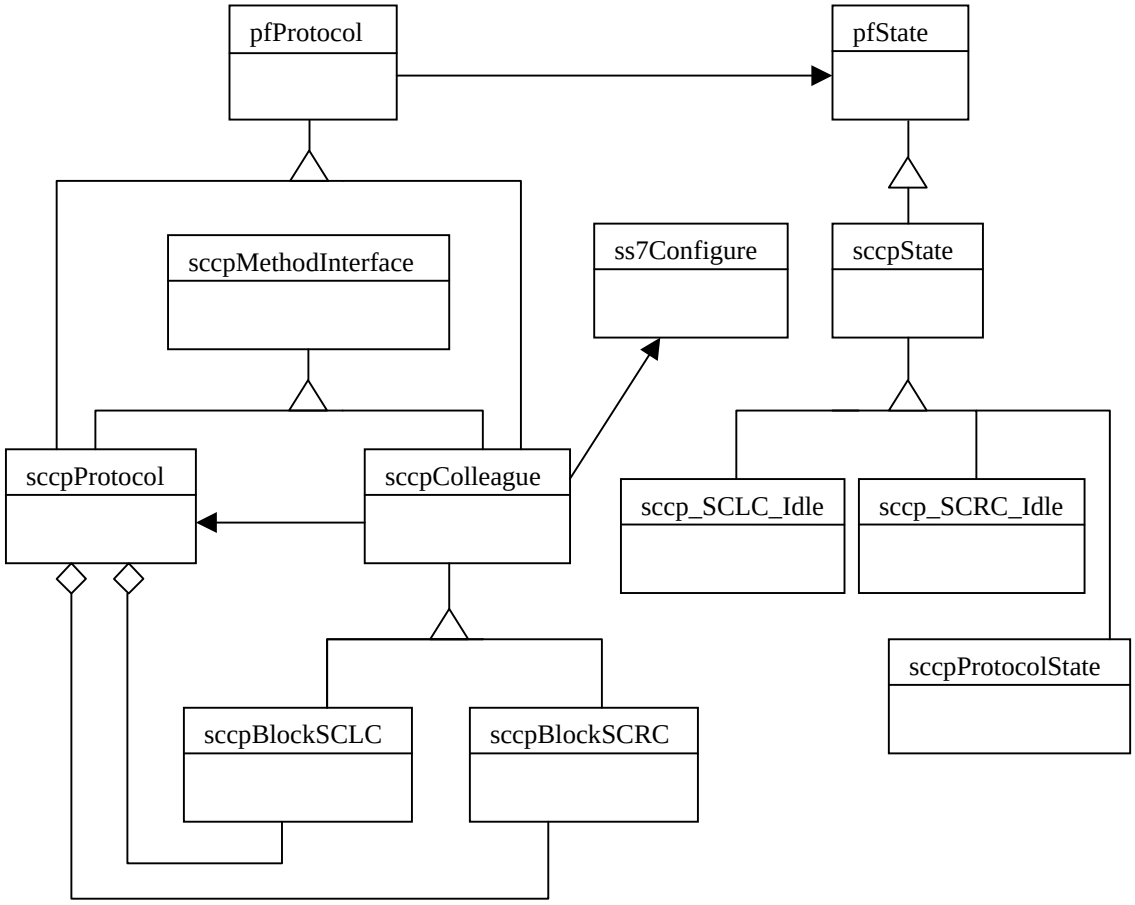

Figure 3. Class hierarchy.

The sccpProtocol conduit interacts with upper and lower layers. The protocol has all blocks as attributes. Incoming messengers are directed to the right block in the sccpProtocol and blocks can interact with each other via the sccpProtocol. All interactions inside the SCCP are synchronous.

PDUs are implemented as messengers. Only unitdata PDU (UDT) is supported in this version. A base class for PDUs includes methods to encode/decode addresses and check mandatory variable fields.

3 Implementation details

Configuration of address translation and routing tables and other SS7 parameters like local address and point code are handled with a SS7Configure object. A proxy to this configuration object implementation is given as parameter in a create method for the SCCP protocol.

The SCCP protocol and its blocks with state machines are implemented using OVOPS++. Blocks have different accept methods to achieve synchronous interactions between blocks.

4 Features implemented

Basic connectionless service (protocol class 0) is implemented without segmenting and reassembling features. Return option is not supported. Due to issues mentioned above only Unitdata (UDT) message is implemented and messages are discarded when error occurs. The following table compares some implemented and unimplemented issues.

IMPLEMENTED	**NOT IMPLEMENTED**
Protocol class 0 (Basic Connectionless Service)	Protocol classes 1-3 (sequenced Connectionless Service and both connection-oriented classes)
UDT message	XUDT, UDTS, XUDTS messages Connection-oriented messages Management messages

Table 2. Implemented and not implemented features.

5 Known limitations

Because segmenting and reassemble features are not implemented, standardized message data length (255) may exceed. Due to that problem message data length is coded using unstandardized 16 bit length.

Also signaling link selection (SLS) is not used in this version.

6 Future development

Protocol class 1 (sequenced connectionless service) should be implement to support segmentation and reassemble features. After that unstandardized message data length can be fixed. Also message return option would be useful feature.

7 References

[1] ITU-T Recommendation Q.711, Signalling System No.7 – Functional Description of the Signalling Connection Control Part, 03/93

[2] ITU-T Recommendation Q.712, Signalling System No.7 – Definition and Function of SCCP Messages, 03/93

[3] ITU-T Recommendation Q.713, Signalling System No.7 – SCCP Formats and Codes, 03/93

[4] ITU-T Recommendation Q.714, Signalling System No.7 – Signalling Connection Control Part Procedures, 03/93