Engineering aspects of SOSM

Possibility of legal interception of messages is one of requirements of the national legislation, which is usually obligatory for every telecommunications service. It is well known now that none electronic exchange can be supplied at telephone network without supporting SOSM functions. So producers of the exchanges face a hard issue when realizing these functions. The major complexity consists of realizing a physical interface between an exchange and Control Point (CP). Other problem is necessity to realize functional part of SOSM. There are three general ways for realizing SOSM at electronic exchanges. The first one - the full realizing SOSM and physical interfaces in an exchange.

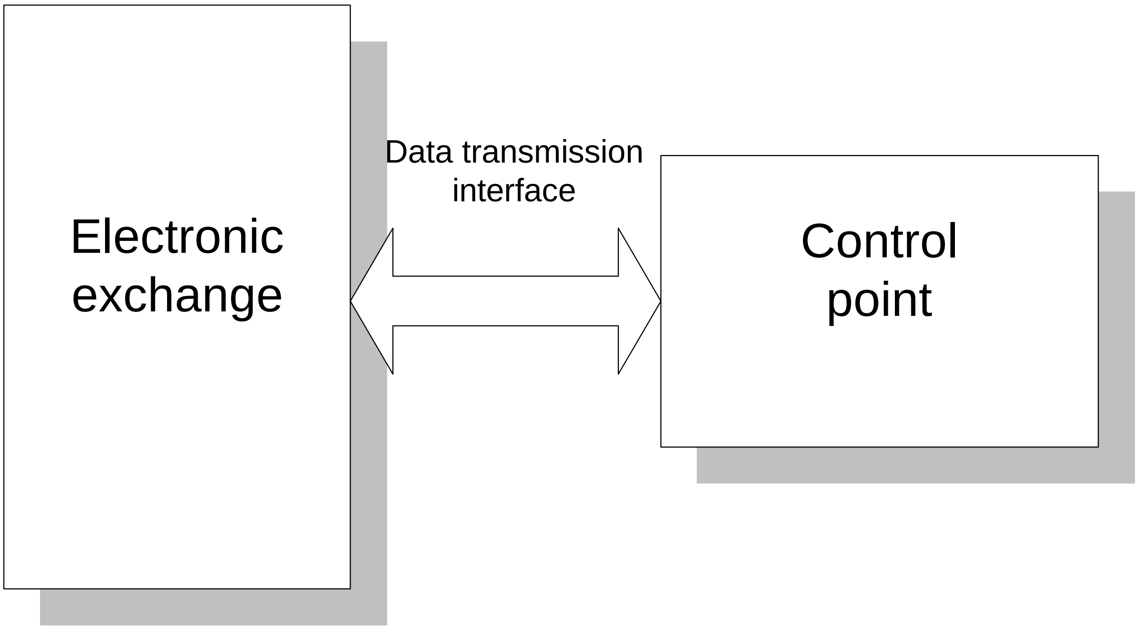


Fig. 1. Realizing SOSM and physical interface in an exchange.

But by no means every producer can use such the way. The cardinal difficulty is realizing a physical interface between an exchange and CP.

Another way for realizing SOSM in an exchange includes realizing the operating logic in the same exchange and using a converter to match the physical interface. (Fig. 2).

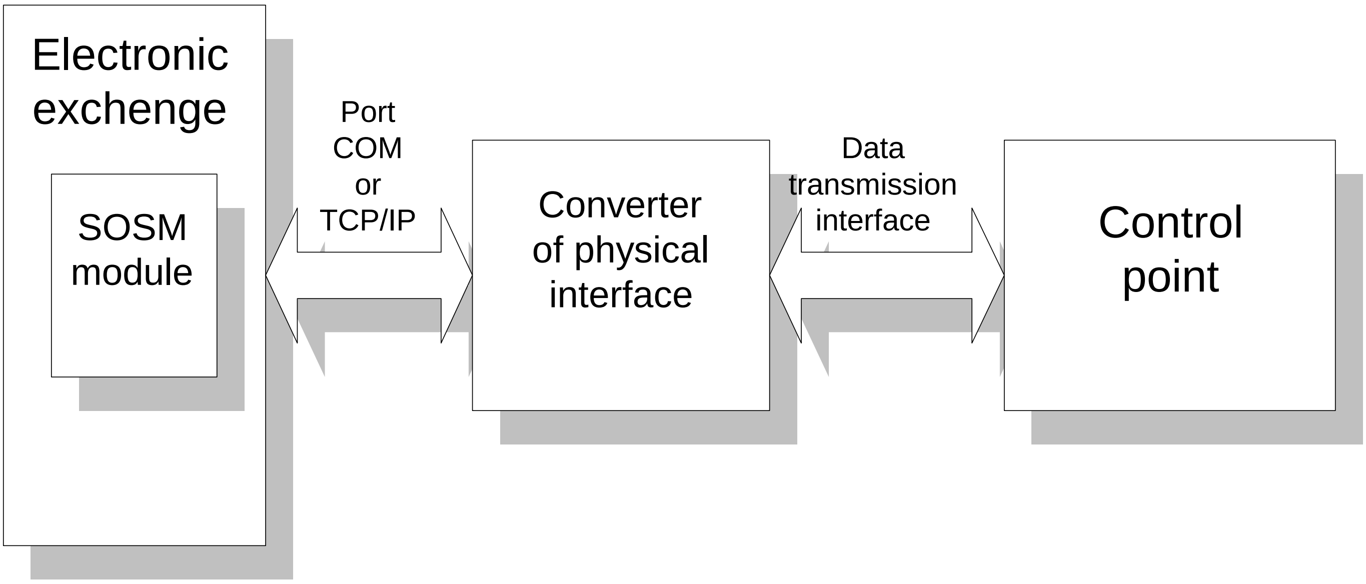


Fig. 2. Realizing SOSM in an exchange.

An advantage of such the decision is possibility for the module SOSM to receive all the necessary information directly from the other modules of the exchange. Corresponding speed is high enough, and delays in response to incoming impacts from the CP side are minimized. It is of particularly importance in the case of large traffic between the exchange and CP. The negative side of this decision is often long and hard debugging at SOSM implementation in the exchange. But main problems arise nevertheless when realizing the physical interface. It is caused by using the synchronous interface V.24 and the protocol X.25 to provide interaction. Their implementation in an exchange is sometimes complicated or fully impossible. As concerning V.24 it is especially true. Just for this reason, that converters of physical interface are used, and these can be of several kinds as well. The given converters can be connected to an exchange in different ways: through usual asynchronous COM-port, through a local network according TCP/IP protocol or by one of some different more exotic ways. In particular, so called PAD can be used as such the converter - for converting from serial asynchronous port into synchronous interface with the protocol X.25 realizing. However here an implicit trouble also exists. It is caused by continuous information flow received from the exchange side at the converter input. It is particularly urgent for COM-port, where transmission is fulfilled in byte-by-byte mode. Then PAD cannot distinguish beginning of a new package of SOSM layer to place it into package X.25 correctly. PAD collects information, which is necessary to form package X.25 and send it to the CP side. An erroneous situation occurs as the result, when the beginning of the package is in one package X.25, and its end is in other package. So the converters should have some “intelligibility” and distinguish a beginning SOSM package in the incoming information flow. There are a few of such the converters, which are intended for using in the SOSM area, in the meantime, but they are available. For example converters XSM from serial asynchronous port or TCP/IP protocol into synchronous interface with X.25 protocol realizing, which are produced by LONIIS. The present converters ensure each SOSM package location only within one package X.25.

The third way for SOSM realizing is possible in a remote computer connected to the exchange via some interface. For example by right of a managing terminal (Fig. 3).

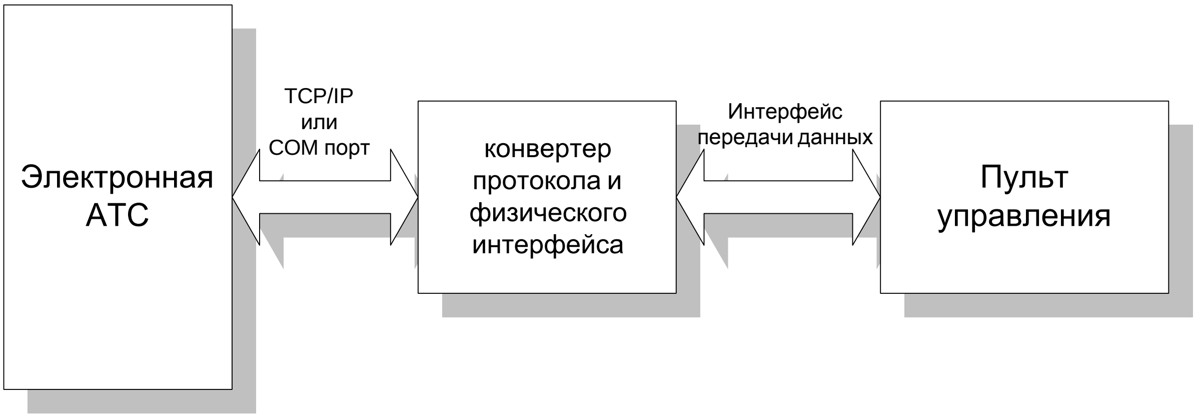
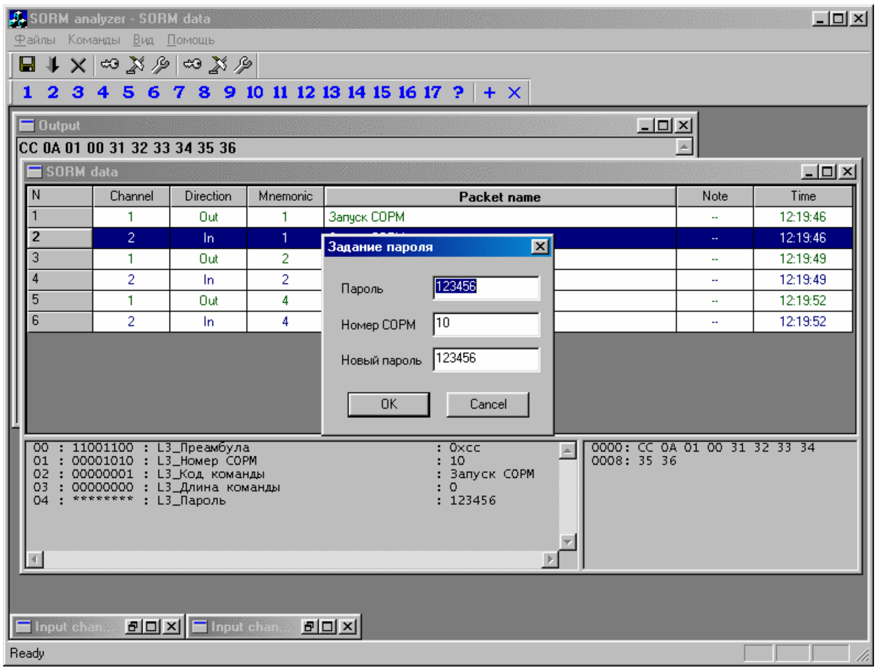

Электронная АТС
TCP/IP или COM порт
конвертер протокола и физического интерфейса
Интерфейс передачи данных
Пульт управления

Fig.3. Implementation SOSM in a protocol converter

Advantage of this variant is no changing the exchange software or a small changing. However, this method has its own shortcomings. In particular, the computer should know about calls of subscribers under monitoring. In this case either the exchange should have the list of subscribers under monitoring, or it should translate information about all the existing calls, and SOSM module should filter this information. One more obstacle can be incomplete received information, and incomplete information transmitted to CP as a result.

As shows experience, the second way of realizing SOSM is extremely seldom in using. Mostly, producers of exchanges choose the first or the second way. It is very often, that the synchronous interface and X.25 are implemented directly in an exchange. One can note also large number of converters of physical interface operating via port COM, which are used to match an interface between CP and exchange. Converters TCP/IP are used highly seldom. In principle, it can be explained very simply: access via serial port is available in many exchanges, while access via local network is quite seldom yet.

Another interesting question is debugging SOSM protocol itself. Here also, all is different in different cases. Implementing SOSM is a very laborious. And when debugging, as simple as possible facilities are used to access to the exchange. Synchronous interface and protocol X.25 are very seldom used for debugging SOSM. Besides, to have in lease a CP simulator is not always possible. And in principle it is not necessary. Therefore producers develop testing SW of their own. Time for development of such the SW is always limited. Because the limited time the result may be unsuccessful. Commonly when debugging, the programs are used, which allow to create a line of bytes and send it to the exchange. Received in response line of bytes is displayed at the screen. There is not time enough for structured data input in opening dialogues, where all the fields have inscriptions, for displaying information at the screen with full it deciphering, for previously sent commands convenient retrieval. It is observed in practice, that convenient debug aids provide development period 1.5 - 2 times shorter. This is particularly true for SOSM, where data can reach 50 bytes in length. To retrieve the necessary information in such a long line, it takes much time. Some producers, which understand the problem of debugging exchanges, expend great amount of time and means to develop qualitative test facilities, during which realizing errors can occur as well. Therefore LONIIS has developed and offers qualitative test facilities, which allow to shorten considerably periods of development and debugging SOSM protocol at telephone exchanges. These are SOSM protocol analyzers, which operate via serial asynchronous port, via local network TCP/IP, support two languages: Russian and English and intended just for testing fixed and mobile options of SOSM (Fig. 4). Besides, the given analyzers are compatible with other equipment of LONIIS production, e.g. converters.



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CC 0A 01 00 31 32 33 34 35 36
```

N	Channel	Direction	Mnemonic	Packet name	Note	Time
1	1	Out	1	Запуск СОРМ	--	12:19:46
2	2	In	1		--	12:19:46
3	1	Out	2		--	12:19:49
4	2	In	2		--	12:19:49
5	1	Out	4		--	12:19:52
6	2	In	4		--	12:19:52

Пароль 123456

Номер СОРМ 10

Новый пароль 123456

```
00 : 11001100 : L3_Преамбула                         : 0xcc
01 : 00001010 : L3_Номер СОРМ                        : 10
02 : 00000001 : L3_Код команды                       : Запуск СОРМ
03 : 00000000 : L3_Длина команды                     : 0
04 : ******** : L3_Пароль                            : 123456
```

```
0000: CC 0A 01 00 31 32 33 34
0008: 35 36
```

Fig. 4. Debug aids for SOSM protocol