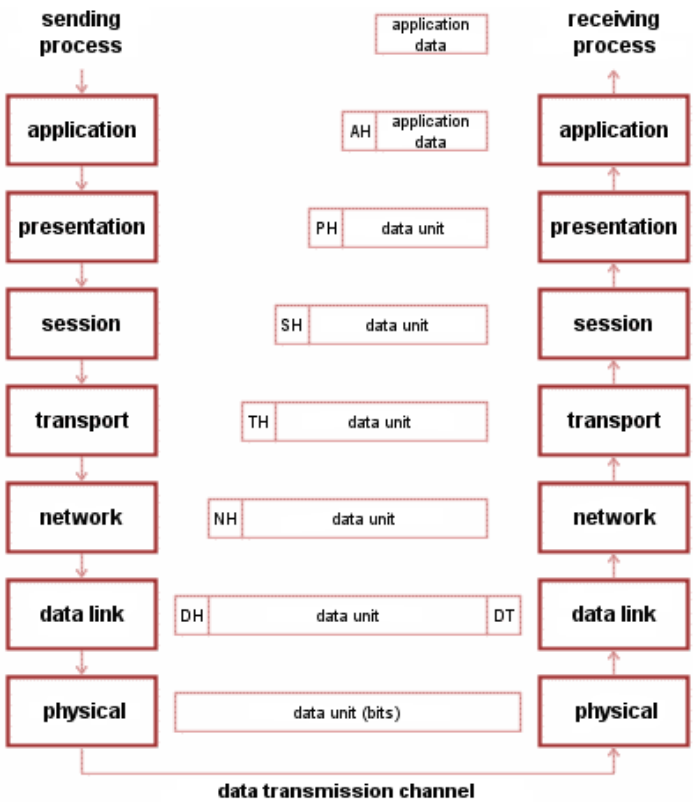
The OSI model, continuation

The data transmission through the OSI model

The transmitting process gives the data to be sent to the receiving process to the application layer which adds to them an application header AH (AH may be empty). The result is then transmitted to the presentation layer.

The presentation layer then transforms this message and adds (or not) a new header (possibly empty). The presentation layer does not know and does not have to know the possible existence of AH; actually, for the presentation layer, AH is part of the user data. Once the data processing is finished, the presentation layer sends the new "message" to the session layer and the same process starts again.

The data then reach the physical layer which will indeed transmit the data to the recipient. Once received, the message will go up the layers and the headers are gradually removed until it reaches the receiving process:



The most important concept is as follows: it should be considered that each layer is programmed as if it were really horizontal, i.e. as if it dialogued directly with its receiving peer layer. When dialoguing with its peer layer, each layer adds a header and sends it (virtually, thanks to the subjacent layer) to its peer layer.

Criticism of the OSI model

The most striking issue concerning the OSI model is that it is perhaps the most studied and most unanimously accepted network structure and yet it is not the model which it is really implemented and used. The specialists, who analyzed this failure, determined 4 main reasons.

It was not the right moment

David Clark from the MIT has developed the following theory regarding the manner to publish a standard t the right time. To him, in the cycle of life of a standard, there are 2 principal peaks of activity: the research carried out in the field covered by the standard, and the industrial investments for the implementation and deployment of the standard. These two peaks are separated by a off-peak of activity that actually appears to be the ideal moment for the publication of the standard: it is neither too early compared to research so that we control the technology, nor too late for the investments and manufacturers are ready to spend capital to implement it.

The OSI model was perfectly released regarding research, but alas, the **TCP/IP model** was already receiving huge investments (when the OSI model was released, the American universities were already successfully using TCP/IP) and the manufacturers did not feel like investing on it.

It was not the right technology

The OSI model is maybe to complete and too complex. The gap between the concrete use (implementation) and the model is sometimes significant. Indeed, few programs can use or wrongly use the 7 layers of the model: the session and presentation layers are hardly used and on contrary the data link and network layers are often split into several sub-layers, since they are pretty complex.

The OSI model is in fact too complex to be effectively and properly implemented. The committee that wrote the standard even had to leave aside some technical points, like security and coding, so much it was delicate to preserve a well defined role to each layer completed with these extra technical points. This model is also redundant (the flow control and the error control appear in most layers). At the implementation level, TCP/IP is much more optimized and effective.

The most significant criticism that one can make against the OSI model is that it is not adapted at all to telecommunication applications on computer! Some choices are in disagreement with the way computers and software communicate. The standard actually uses "system interruptions" to report events, and with high level programming languages, that is not very realizable.

It was not the right implementation

This simply comes from the fact that the model is relatively complex, and therefore the first implementations were pretty heavy and slow. Conversely, the first implementation of TCP/IP in the Unix system of the Berkeley University (BSD) was free and relatively effective. Historically, people thus had a natural tendency to use TCP/IP.

It was not the right policy

Actually, the OSI model suffered from its too strong standardization. The efforts of implementation of the model were above all "bureaucratic" and therefore people might have discredited the model.

The future of the OSI model

Regarding its use and implementation, and in spite of an update of the model in 1994, the OSI model has clearly lost the war against TCP/IP. Only few dominating manufacturers keep the model but it is likely to disappear, all the more quickly since the Internet (and thus TCP/IP) is developing.

However, the OSI model will still remain for a while in memories for several reasons. First, it is one of the first main efforts as regards standardization in the area of networks. Manufacturers now tend to do with TCP/IP, but also WAP, UMTS etc. what they were supposed to do with the OSI model, namely to propose standardizations from the beginning. The OSI model will also remain memories for another reason: even if TCP/IP is the model concretely used, people have tendency and use OSI like the current network model of reference. In fact, TCP/IP and OSI have very close structures, and it is especially the effort of standardization of OSI which imposed this general "confusion" between the 2 models. One commonly tends to consider TCP/IP as the real implementation of OSI.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the OSI model

the TCP/IP model