# OSS architecture and definitions

**Operational support systems** (OSS), also called Operations Support Systems, is a collective term for the telecoms software solutions used to support network operations. The term encompasses software that supports network operation & management, service delivery and fulfilment and service assurance as defined by the International Telecommunications Union (ITU).

Within the OSS, the Telecommunications Management Network (TMN) architecture is a reference model for a hierarchical telecommunications management approach. Its purpose is to partition the functional areas of management into layers. The ITU Telecommunication Standardization Sector (ITU-T) defined the TMN architecture in 1988 and it is described in Recommendation M.3010 and other documents. During the 1990’s, new OSS architecture definitions were done by the ITU-T in its TMN model. This established a 5-layer model of TMN applicable within an OSS. The key benefit of this architecture is to identify five functional levels of telecommunications management: business management layer (BML), service management layer (SML), network management layer (NML), element management layer (EML), and the (increasingly intelligent) NEs in the network element layer (NEL).

TMN separates the management responsibilities based on these layers. This makes it possible to distribute these functions or applications over the multiple disciplines of a service provider and use different operating systems, different databases, and different programming languages. TMN calls for each layer to interface with adjacent layers through an appropriate interface to provide communications between applications, this enables the use of standard computing technologies. The TMN M.3010 document allows for the use of multiple protocols.

The function of each Layer can be summarized by the following examples:

* **Business Management Layer (BML)**
  + Manages the overall business, e.g. archiving return on investment, market share, employee satisfaction, and community/government goals.
* **Service Management Layer (SML)**
  + Manages the services offered to the customers, e.g. meeting customer service levels, service quality, cost and time to market objectives.
* **Network Management Layer (NML)**
  + Manages the network and systems that deliver services, e.g. capacity, diversity and congestion.
* **Element Management Layer (EML)**
  + Manages the network elements and systems that deliver services.
* **Network Elements Layer (NEL)**
  + Radios, switches, power systems, transmission, distribution systems, etc…

## Element / Network Management System

An element management system (EMS) manages one or more of a specific type of telecommunications network element (NE). Typically, the EMS manages the functions and capabilities within each NE but does not manage the traffic between different NEs in the network. To support management of the traffic between itself and other NEs, the EMS communicates upward to higher-level network management systems (NMS) as described in the TMN layered model. The EMS provides the foundation to implement TMN–layered OSS architectures that enable service providers to meet customer needs for rapid deployment of new services, as well as meeting stringent quality of service (QoS) requirements. The EMS–to–NMS interface is established using open standards such as simple network management protocol (SNMP) and common object request broker architecture (CORBA) which are consistent with the TMN framework.

## Element Management System

TMN model is simple but elegant and has been effectively used to represent the complex relationships within network-management architectures graphically. Originally based on common management information service element (CMISE), the object-oriented technology available at the time of inception in the late 80’s, the model now demonstrates its flexibility with the recent adoption of technologies such as CORBA, as we drive toward a more generic data-processing type of computing. This evolution of CORBA progressed in much the same way as SNMP led its generation of protocol adoption.

EMS's should, by strict adherence with the TMN model, communicate with their NEs by using the common management information protocol (CMIP). This, however, takes no recognition of the fact that most devices deployed in the marketplace use other protocols such as TL1, SNMP, HTTP, XML and a variety of proprietary mechanisms. An efficient EMS communicates with its NE using whatever protocol is native to the NE. The effective EMS will also communicate with other higher-level management systems using protocols that are the most cost-effective to implement. Therefore, the TMN layering is achieved by using whatever protocols are appropriate.