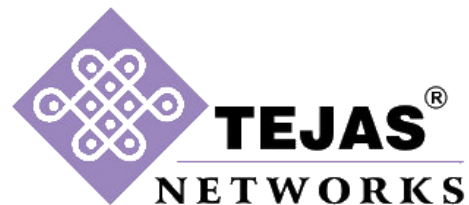


NMS7.5.1.0

Introduction to NMS

Part – 1



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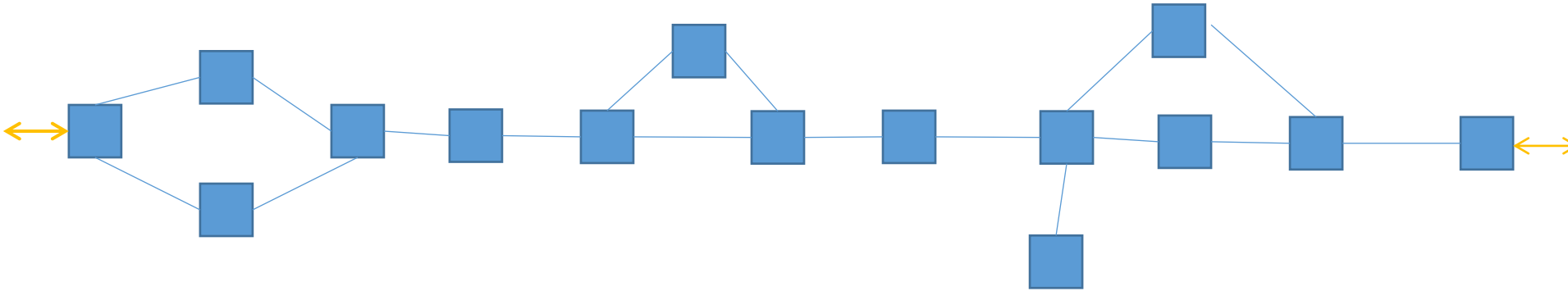


- Introduction to EMS and NMS
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- More about EMS and NMS
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- High level architecture of EMS and NMS

Introduction to EMS and NMS



- Let's consider an example where we need to create circuits/services which has to bypass many nodes.

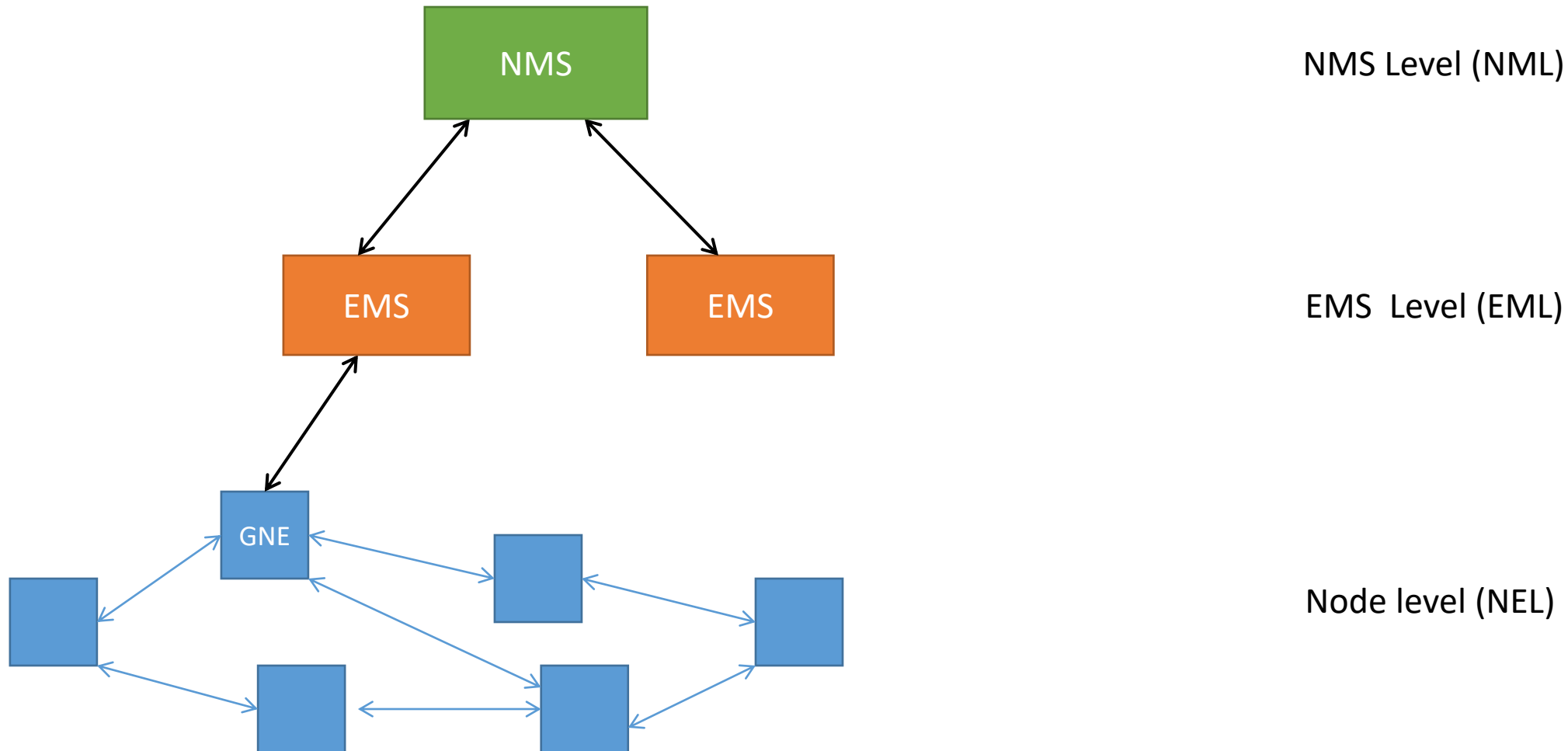


- From node level configuration, we have to login into each and every node and configure circuits/services.
- This procedure involves lot of time.
- Another requirement would be if we have to monitor alarms in network. With node level Management we cannot see all alarms being populated at one place because every node will only display it's own set of alarms.
- Due to such requirements and to maintain and monitor huge network, We need other ways to manage our network. These include higher levels of management and they are called EMS and NMS.

Introduction to EMS and NMS



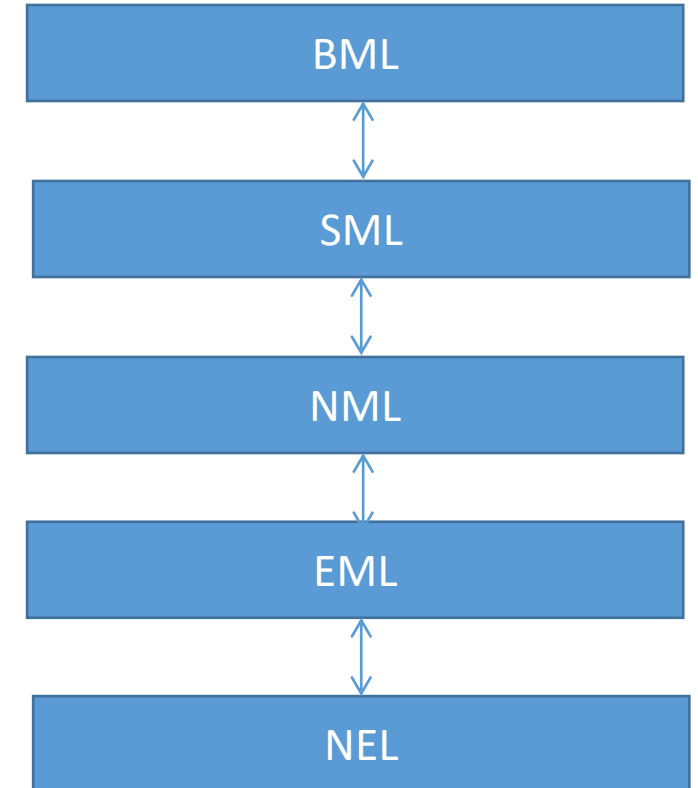
- Few number of nodes are managed by EMS and many such EMSs' is managed by NMS. This hierarchy is described in TMN architecture.



TMN/FCAPS architecture



- The ITU-T introduced the term Telecommunications Management Network (TMN) to describe a separate network that has interfaces to the telecommunication network (or production network). TMN defines interconnection points between the two networks and specifies management functionalities.
- TMN defines 5 management layers
- NEL(Network Element Layer)
- EML(Element Management Layer)
- NML(Network Management Layer)
- SML(Service Management Layer)
- BML(Business Management Layer)



TMN/FCAPS architecture

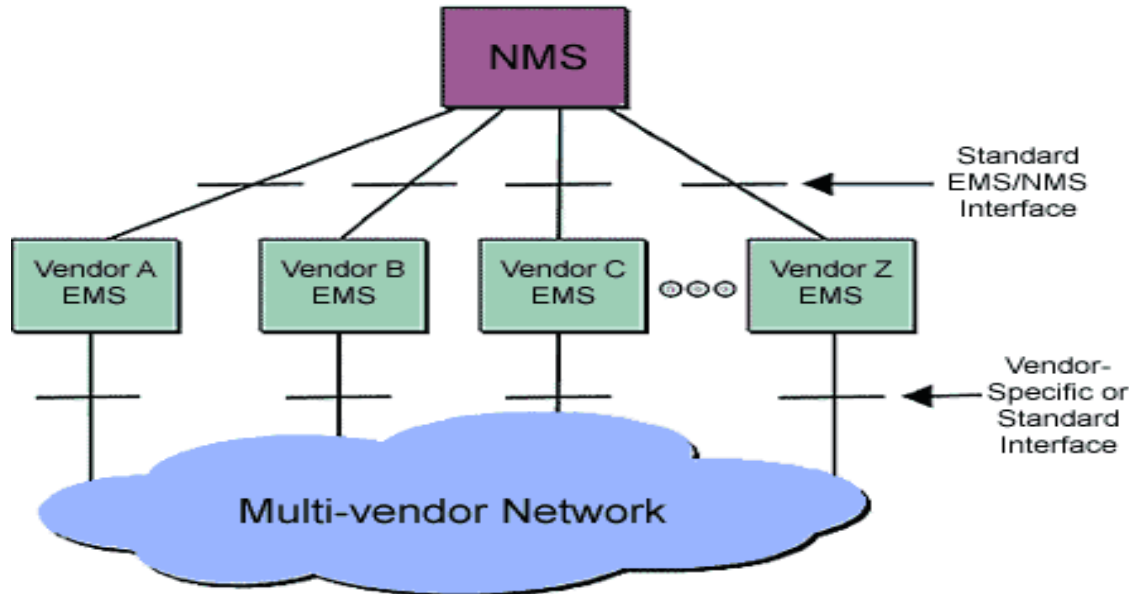


- NEL(Network Element Layer) : The lowest layer is the network element layer comprising network elements such as switches, routers, bridges, transmission facilities, etc.
- EML(Element Management Layer): It provides management functions for network elements on an individual or group basis which are of same type. It also supports an abstraction of the functions provided by the network element layer.
- NML(Network Management Layer): offers a holistic view of the network, between multiple pieces of equipment and independent of device types and vendors. It manages a network as supported by the element management layer.
- SML(Service Management Layer): is concerned with, and responsible for, the contractual aspects of services that are being provided to customers and managing the services provided by a network service provider to customers or to other network service providers.
- BML (Business Management Layer): They include services such as billing, order processing and is concerned with managing the operations of a communications business.

More about EMS and NMS



- In Tejas we have software to support till NML layer. EMS fall under EML and NMS under NML.
- **EMS (Element Management System)**
- It manages one or more of a specific type of network elements (NEs) and of same vendor.
- EMS provides basic commands or configurations to configure the end device.
- The below figure is a conceptual view of where EMSs fit in a network. Networks today are composed of a wide variety of NEs from a large number of vendors.

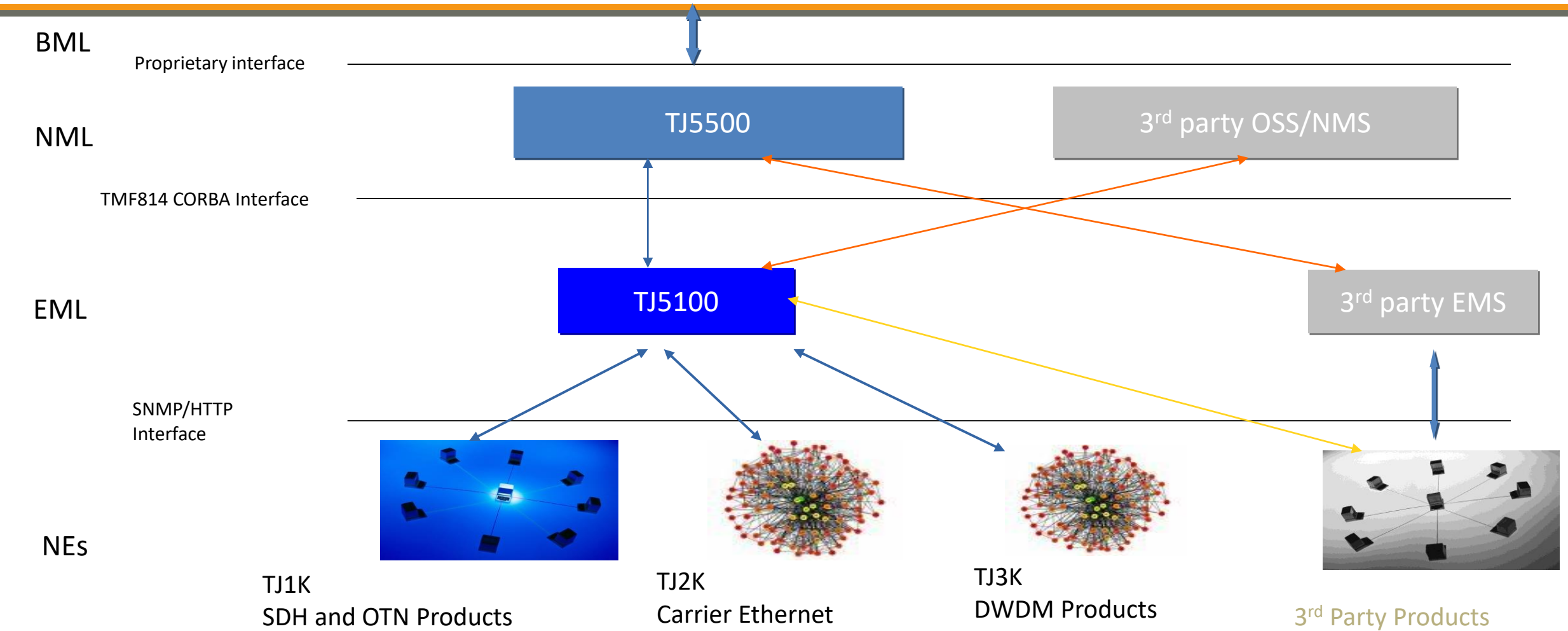


More about EMS and NMS



- **NMS (Network Management System)**
- In general, network management is a service that employs a variety of tools, applications, and devices to assist human network managers in monitoring and maintaining networks.
- It supports Multi-Vendor & Multi-Domain.
- Every Layer has FCAPS functionality, It becomes very prominent in NMS
 - Fault Management—Detect, isolate, notify and correct faults encountered in the network
 - Configuration Management—Configuration aspects of network devices such as configuration file management, inventory management, and software management.
 - Accounting Management—Usage information of network resources.
 - Performance Management—Monitor and measure various aspects of performance so that overall performance can be maintained at an acceptable level
 - Security Management—Provide access to network devices and corporate resources to authorized individuals.

Tejas Management Portfolio



Integration available

Partial Integration available
for select node types

Customized Integration
required

Interfaces and Protocols



- EMS supports either **SNMP or HTTP** to communicate with nodes. SNMP (Simple Network Management Protocol) is a standard communication protocol responsible to send information between node and EMS.
- All communication between EMS and NMS happens through TMF814 CORBA Interface.
- EMS is notified with the Network changes through SNMP Traps, irrespective of the property NECommProtocol.
- NECommProtocol(NE communication Protocol) can be either SNMP or HTTP.
- EMS uses SNMP protocol for fetching System details while adding a node, irrespective of the property NECommProtocol.
- Information flow between Nodes to EMS and EMS to NMS happens through **GET and SET requests.**
- **GET request flow**
- EMS uploads Network data (Config, Alarm, PM), store it in DB.
- EMS keeps the data up-to-date by processing SNMP Traps sent by nodes and re-syncing in case of any data mismatch. (it is set as snmp by default, if it is http, then http is used)
- GET request can be from NMS/ Client UI to EMS. When EMS receives the GET request it fetches the latest information from DB or gets from Node.

Interfaces and Protocols

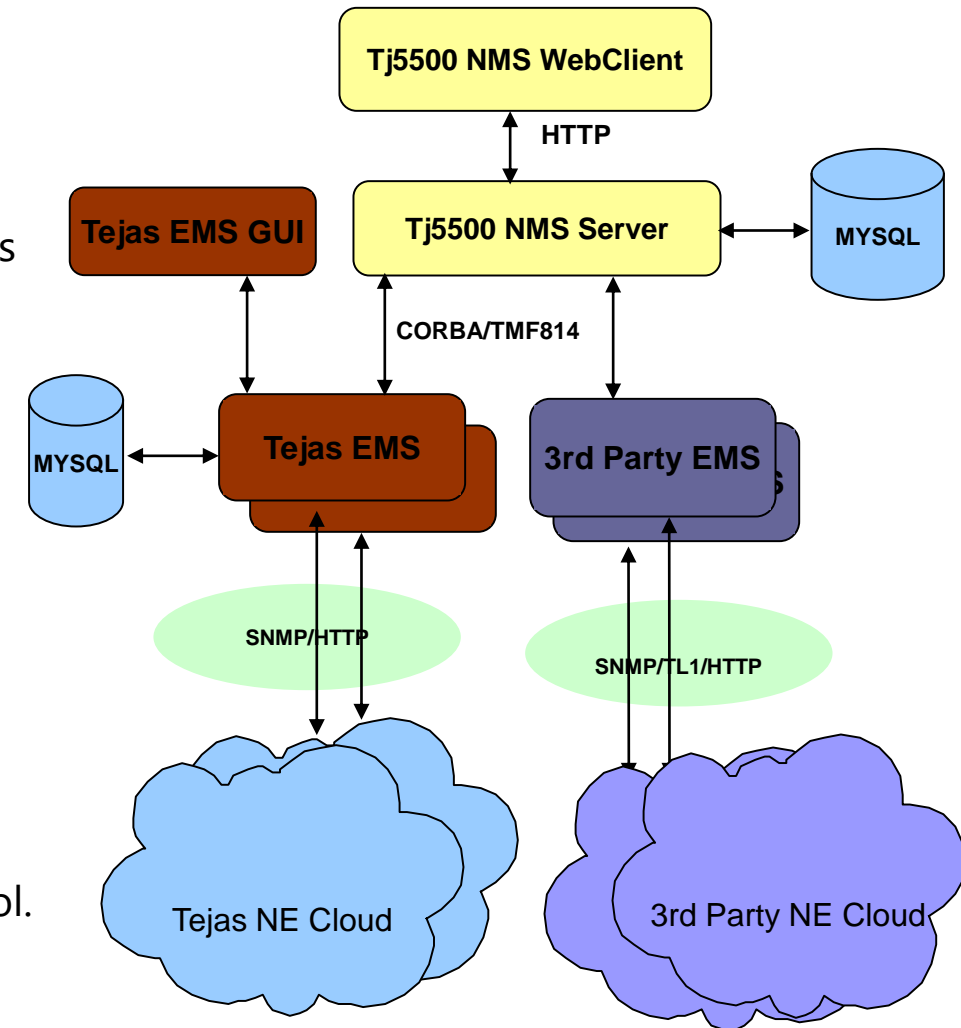


- **SET request flow**
- Upon receiving SET request from its UI/NBI client, EMS validates the data.
- EMS sends the request down to node (SNMP or HTTP request based on the property NECommProtocol)
- Node validates the data and responds back. However, configuration changes are yet to be committed in the node.
- EMS will update its client that Node has accepted the SET request
- Once Node commits the configuration changes and updates its DB, it sends SNMP Trap to registered EMS.
- EMS updates its DB, makes an entry in Audit log and updates its client.

High Level Architecture of EMS and NMS



- Network consist of Tejas and 3rd part network elements. We have Tejas nodes managed by Tejas EMS and different EMS to manage 3rd party nodes. Both of these EMSs' can be integrated in NMS.
- As we have discussed, Communication between nodes and EMS happens through SNMP/HTTP as per protocol supported in node.
- EMS receives information in the form of SNMP traps.
- EMS communicates to NMS server through CORBA/TMF814
- EMS uses MYSQL to store it's own Database and likewise we have Separate Database for NMS.
- EMS and NMS have Server and Client mechanism. Client is the user who wants to access information.
- User can access EMS through EMS GUI
- User can access NMS server using NMS webclient through HTTP protocol.





Thank you