ITU-T Kaleidoscope Conference Innovations in NGN

Managing NGN using the SOA Philosophy

Y. Fun Hu

University of Bradford
y.f.hu@bradford.ac.uk

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Next Generation Network (NGN)

- A IP/IMS based network
- Provide telecommunication services through multiple broadband, QoS-enabled transport technologies – convergence of telecommunications and Internet services
- Service-related functions are independent from underlying transport-related technologies
- Offers unrestricted access for users to different service providers
- Supports generalized mobility, which will allow consistent and ubiquitous provision of services to users

Source : ITU-T Rec. Y.2001

NGN Service characteristics

- **Ubiquitous, real-time, multi-media communications**

- **Intelligent agents distributed throughout the network**

- **Simple and Context-sensitive user interface**

- **Personal service customisation and management**

NGN Architecture overview
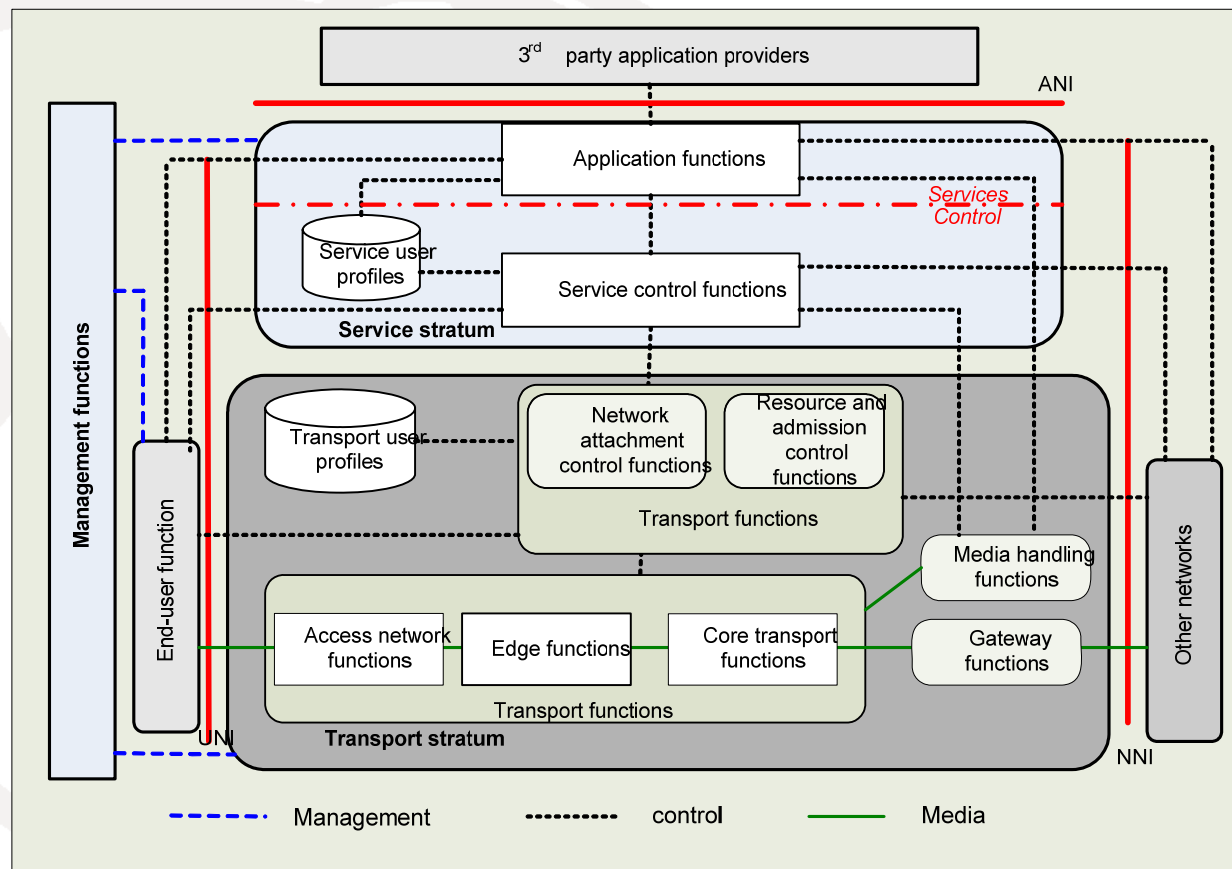
Source : ITU-T Rec. Y.2012

NGN Architecture overview

NGN stratum ➡ Separation of Service layer from the Transport layer

Service stratum

- Provides Service control functions, application support functions and service support functions (such as presence management).
- The Service user profile is used by the service control function and includes information such as the services that user is allowed to use and the simultaneous connections that can be made

Transport stratum

- Provides functions for transfer multimedia streams over the IP network. Transport control functions allocate IP addresses, perform authentication tasks, and enable control functions such as resource admission for guaranteeing QoS.
- Transport user profile includes information for the user authentication data and the bandwidth that occupies when connecting to the access network.

# Management of the NGN (1)

Management Layers
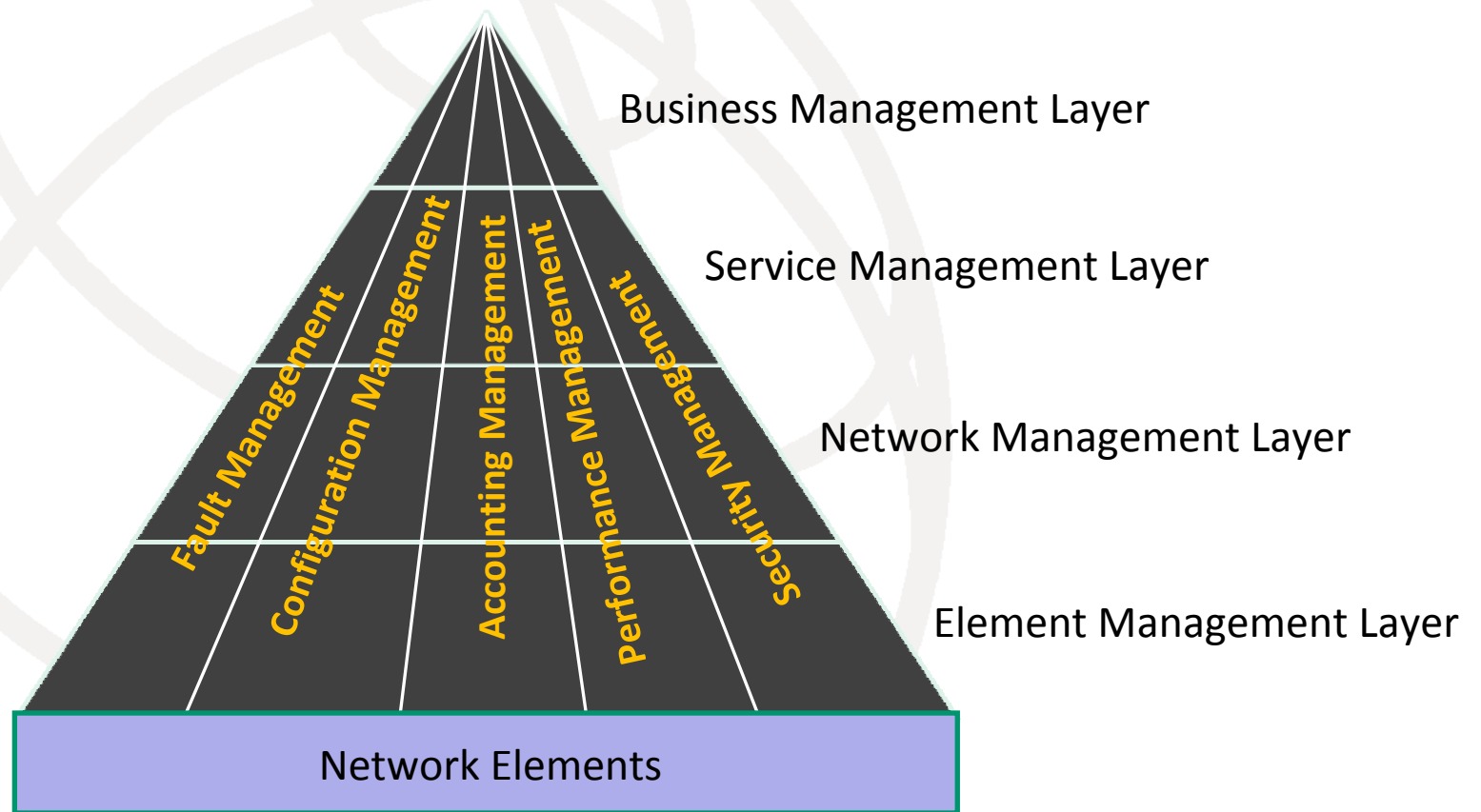
Management of NGN (3)

The management of the NGN requires the consideration of two management components:

- Operations Support Systems (OSS) for Network Management
    - Provides a set of processes that a network operator requires in order to monitor, control and analyze the network.
    - Includes processes that are required to manage and control faults, and perform functions that involve interactions with customers.
- Business Support Systems (BSS) for Business and Service Management
    - Provides processes that a service provider requires to conduct relationships with external stakeholders including customers, partners and suppliers.

Evolution of the Management Architectures

From a simple Manager-Agent model to complex OSS/BSS systems
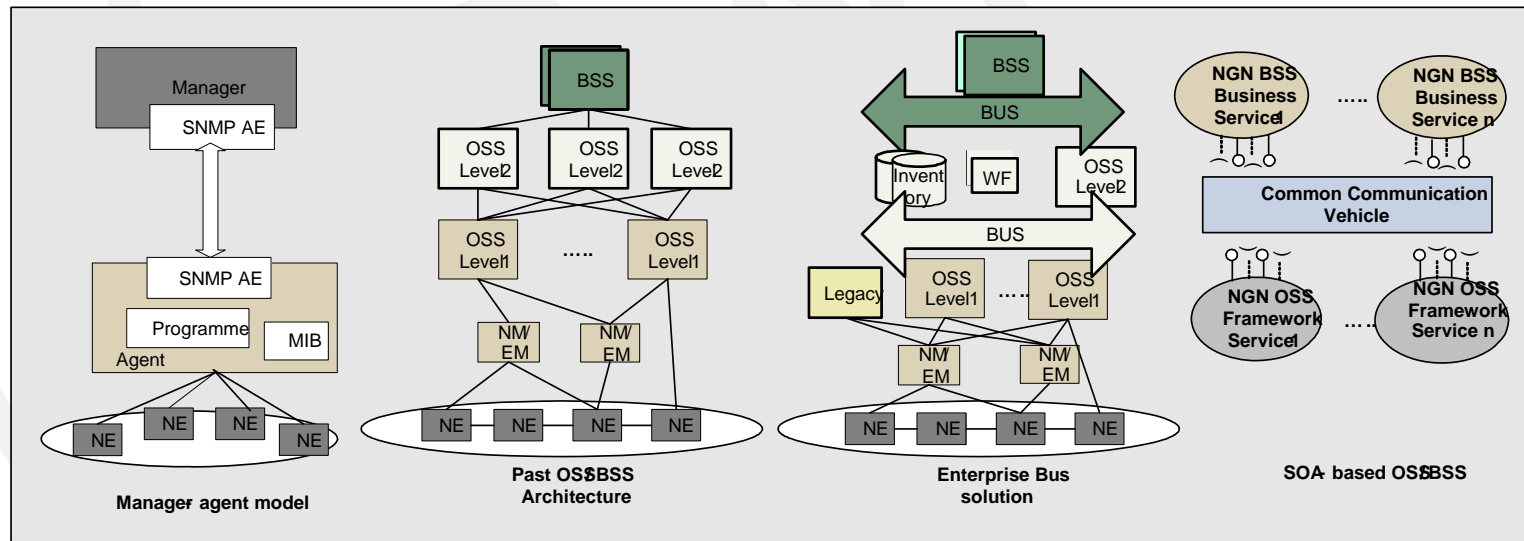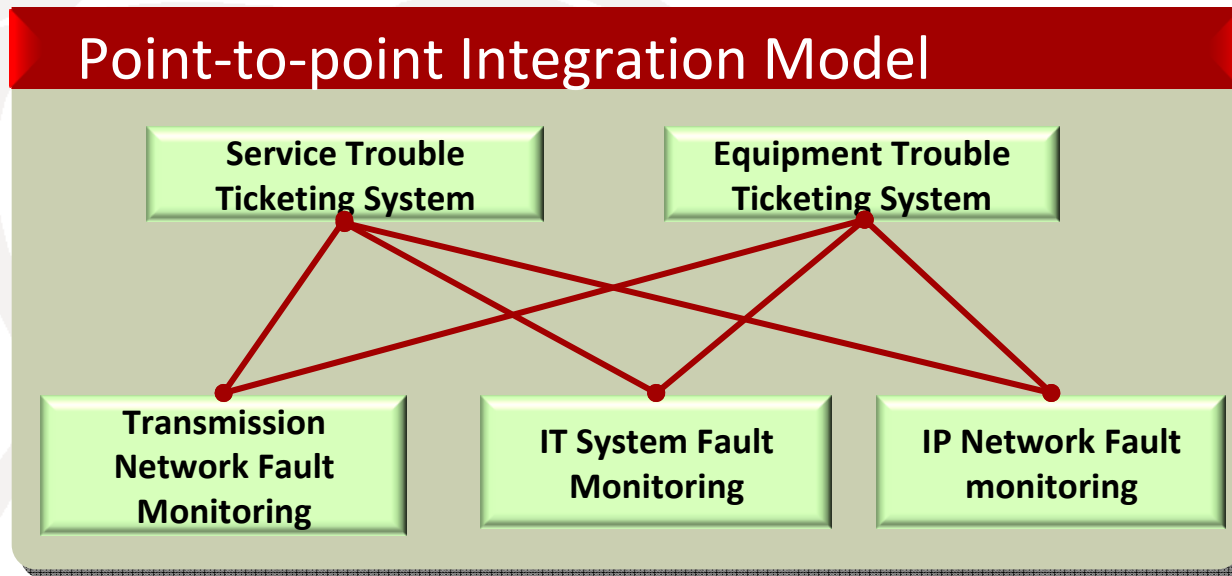

Client-Server   Point-to-point   Enterprise Application Integration (EAI)   Service-Oriented Architecture Based

Point-to-point Architecture

Point-to-point Integration Model

| Service Trouble Ticketing System | Equipment Trouble Ticketing System |

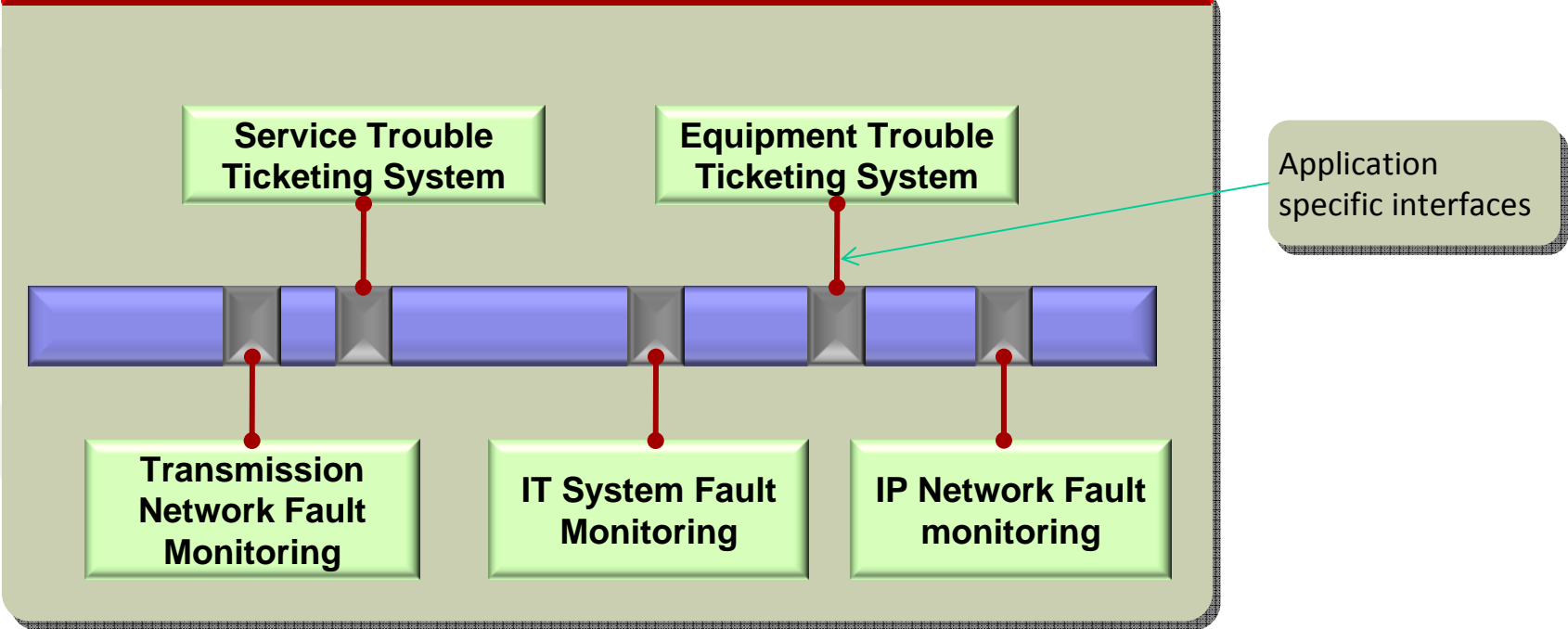| Transmission Network Fault Monitoring | IT System Fault Monitoring | IP Network Fault monitoring |

Linking software systems and applications using point-to-point integration it doesn't work well on a large scale distributed environment such as telecommunications. Drawbacks of this approach is :

- Proprietary messages, APIs
- Every link is custom integration
- Lack of open standards
- Tightly coupling of data and implementation
- Cost
- Operational policies are embedded in application
- Lack of agility

Result of Point-to-Point Management

EAI Management

Traditional EAI Model

Service Trouble Ticketing System

Equipment Trouble Ticketing System

Application specific interfaces

Transmission Network Fault Monitoring

IT System Fault Monitoring

IP Network Fault monitoring

Traditional Enterprise Application Integration patterns do not provide interoperability between heterogeneous platforms due to their tightly-coupled nature.

SOA-based NGN Management

What is SOA ?

Definition according to ITU :

SOA is defined as "a software architecture of services, policies, practices and frameworks in which components can be reused and repurposed rapidly in order to achieve shared and new functionality".

Definition according to J. Hurwitz :

SOA can be defined as: "An Architecture for building business applications as a set of loosely-coupled black-box components orchestrated to deliver a well-defined level of service by linking together business processes."

SOA-based NGN Management

- Support network operations and management and at the same time to support business investment decisions by adopting the SOA principles

- Provide OSS services (monitoring and measurement services) to enhance NGN customer service satisfaction

- Define business choreography, business orchestration and business processes

- Define a unified platform for BSS to access and reuse services provided by the OSS for service management and B2B applications

- Define OSS specific ontology, semantic representation and retrieval of measurement and monitoring information

SOA-based OSS/BSS
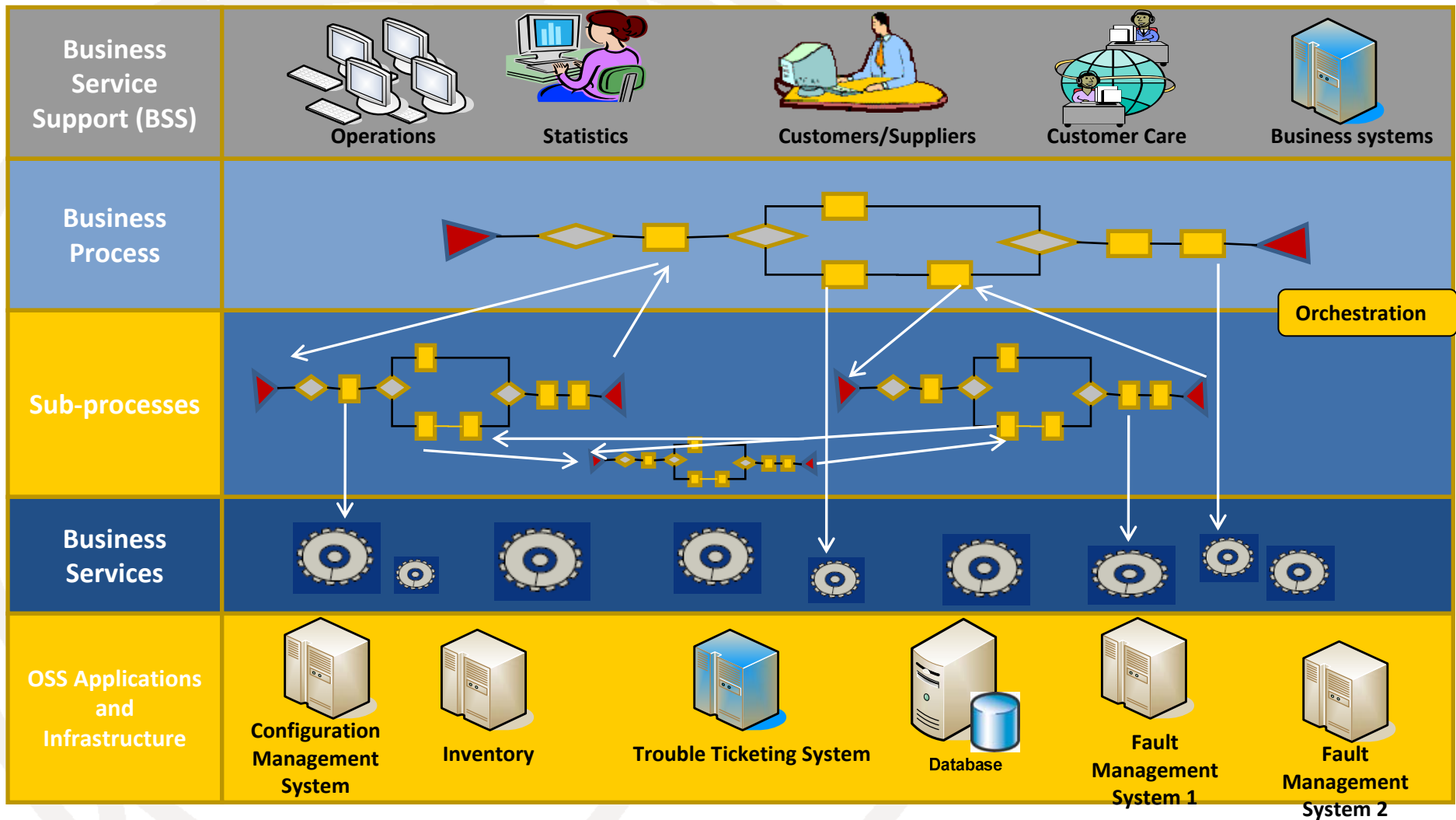
SOA Principles
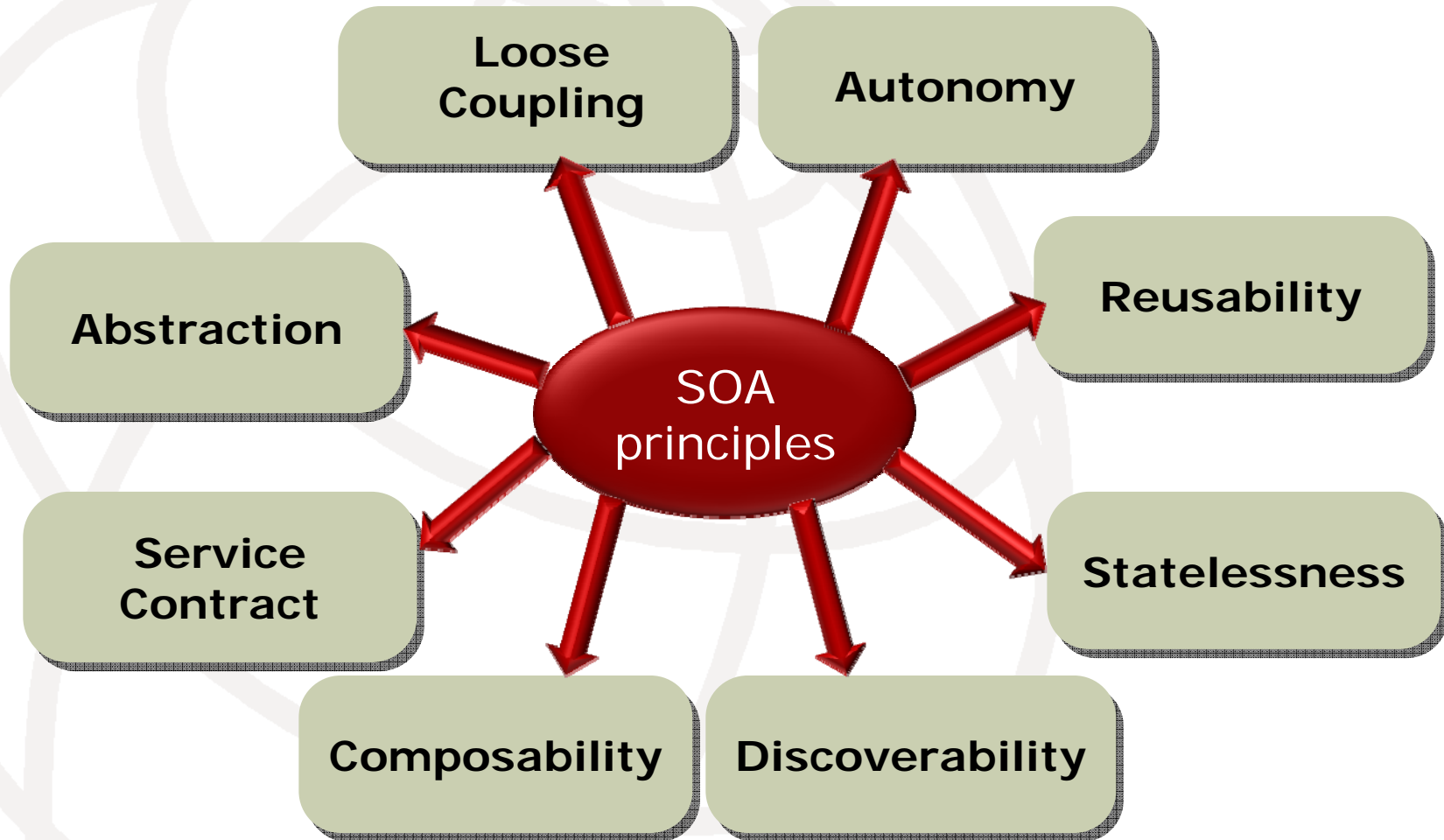
Roles and operations in SOA

Service Provider:
- Provides the platform that hosts access to the service, and the applications that deliver the service capabilities.

Service Requestor:
- An application that invokes or initiates an interaction with a service.
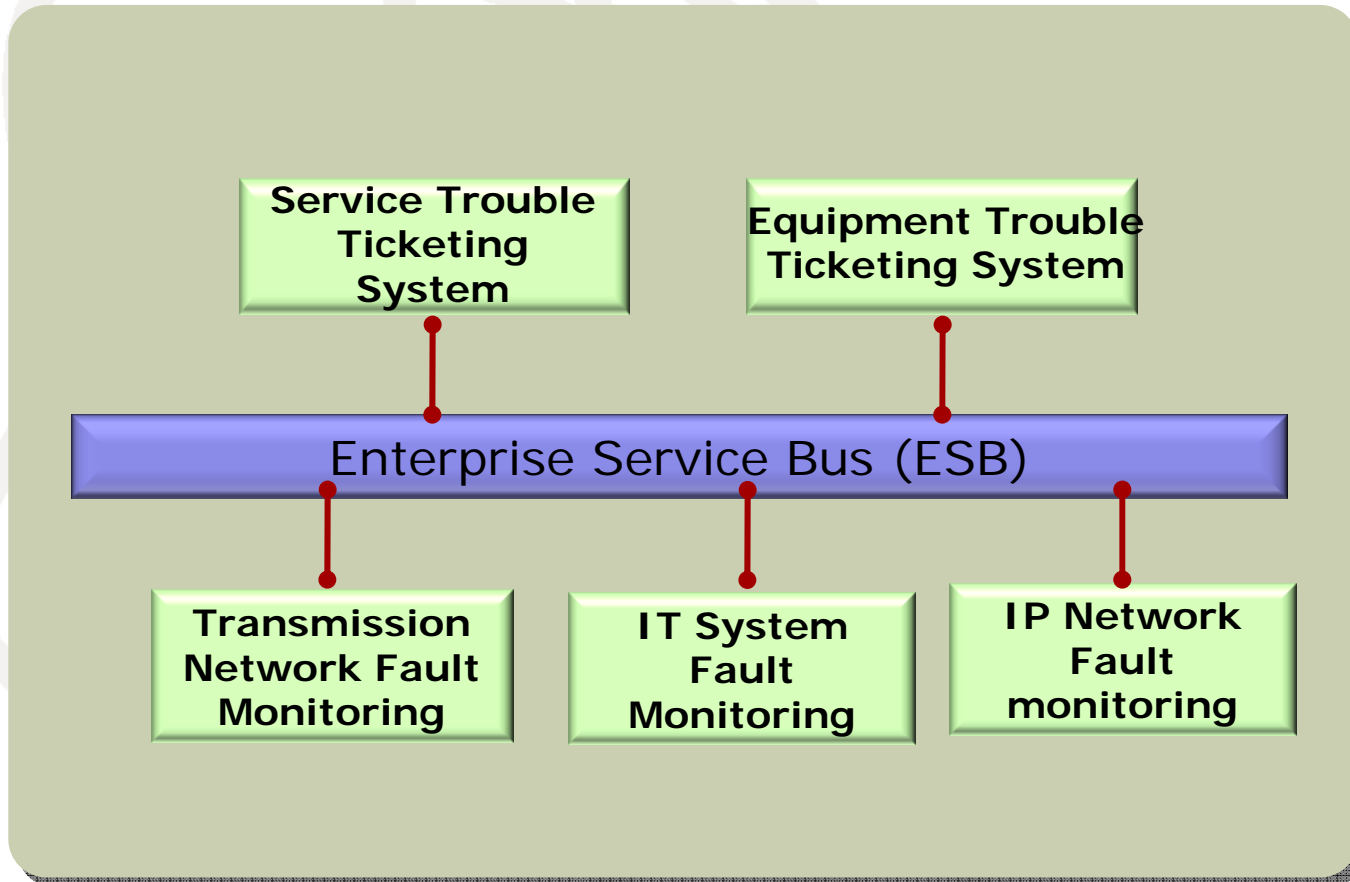- Content and Service aggregation are the two business activities are identified by the Service requestor.

SOA core Model

Service Registry

Find (WSDL)

Bind (WSDL)

Service Requestor

Service Provider

Execute (SOAP)
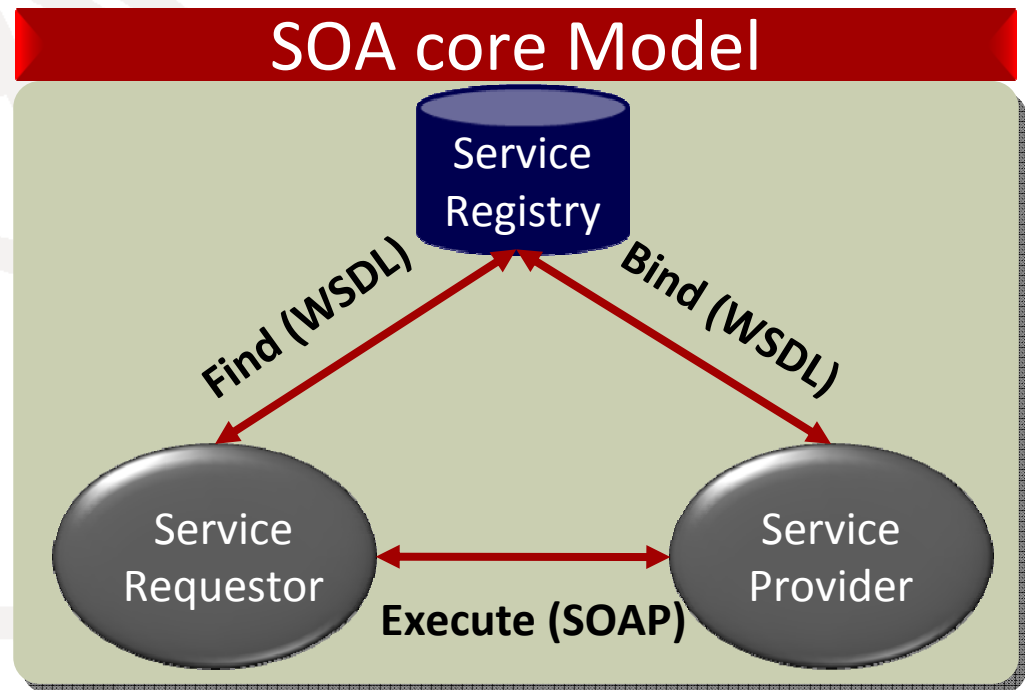
Service Registry:
- A searchable registry that facilitates the Service providers to publish their service descriptions.
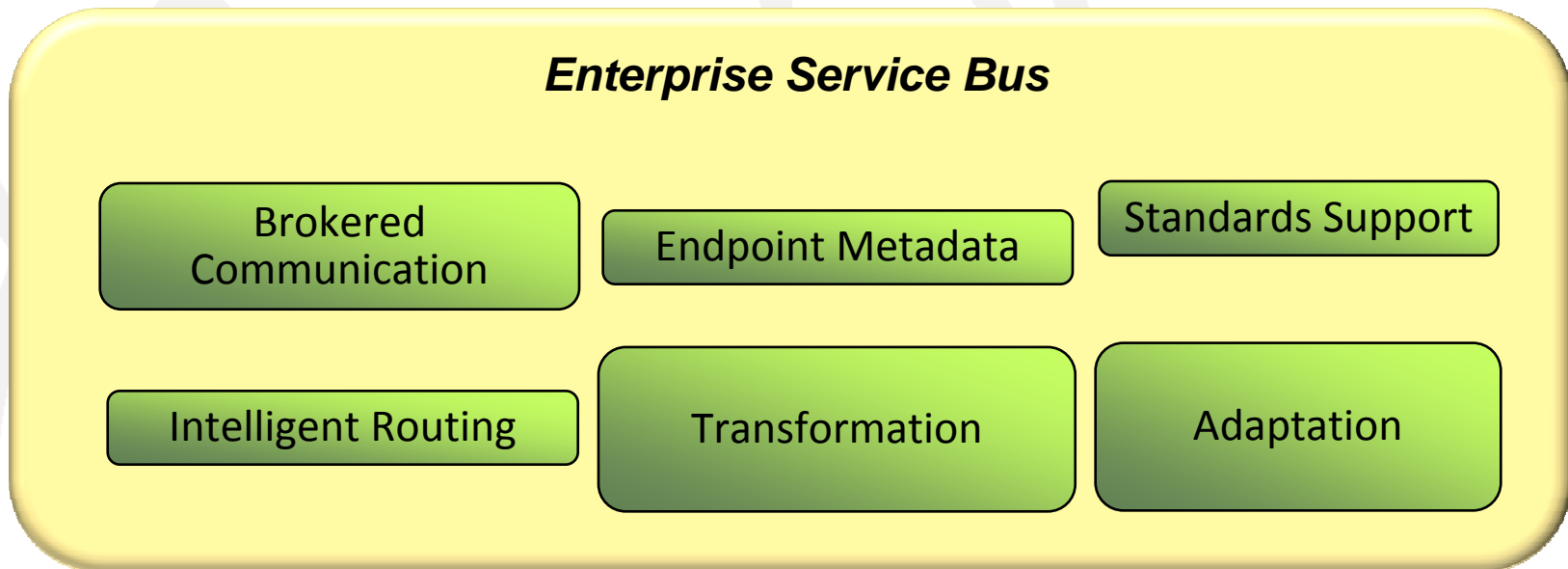
SOA Model

Enterprise Service Bus (ESB)

" A standards-based integration backbone, combining messaging, Web services, transformation, and intelligent routing

-Sonic Software

Enterprise Service Bus

Brokered Communication	Endpoint Metadata	Standards Support
Intelligent Routing	Transformation	Adaptation

Challenges of SOA-based NGN Management

- SOA /ESB technologies still evolving.
- Services requires governance and partnerships.
- SOA means business transformation i.e. a fundamental shift in business model.
- A generic information model is essential to implement SOA philosophy.

Information Models : CIM and SID

- **Information models for managed objects**
  - Telemanagement Forum (TMF) adopts the Shared Information/Data Model (SID)
    - Platform independent information model for telecom service description – both business and technical
  - Distributed Management Task Force (DMTF) adopts the Common Information Mode (CIM)
    - Technology neutral information model primarily focusing on IT resource management and IP Networks
- **Harmonisation between CIM and SID**
    - To provide interoperability between different management solutions used for NGNs

SID Framework

➢ Platform independent information model for telecom service description
➢ Provide a common information/data language
➢ Depict the relationships among the entities
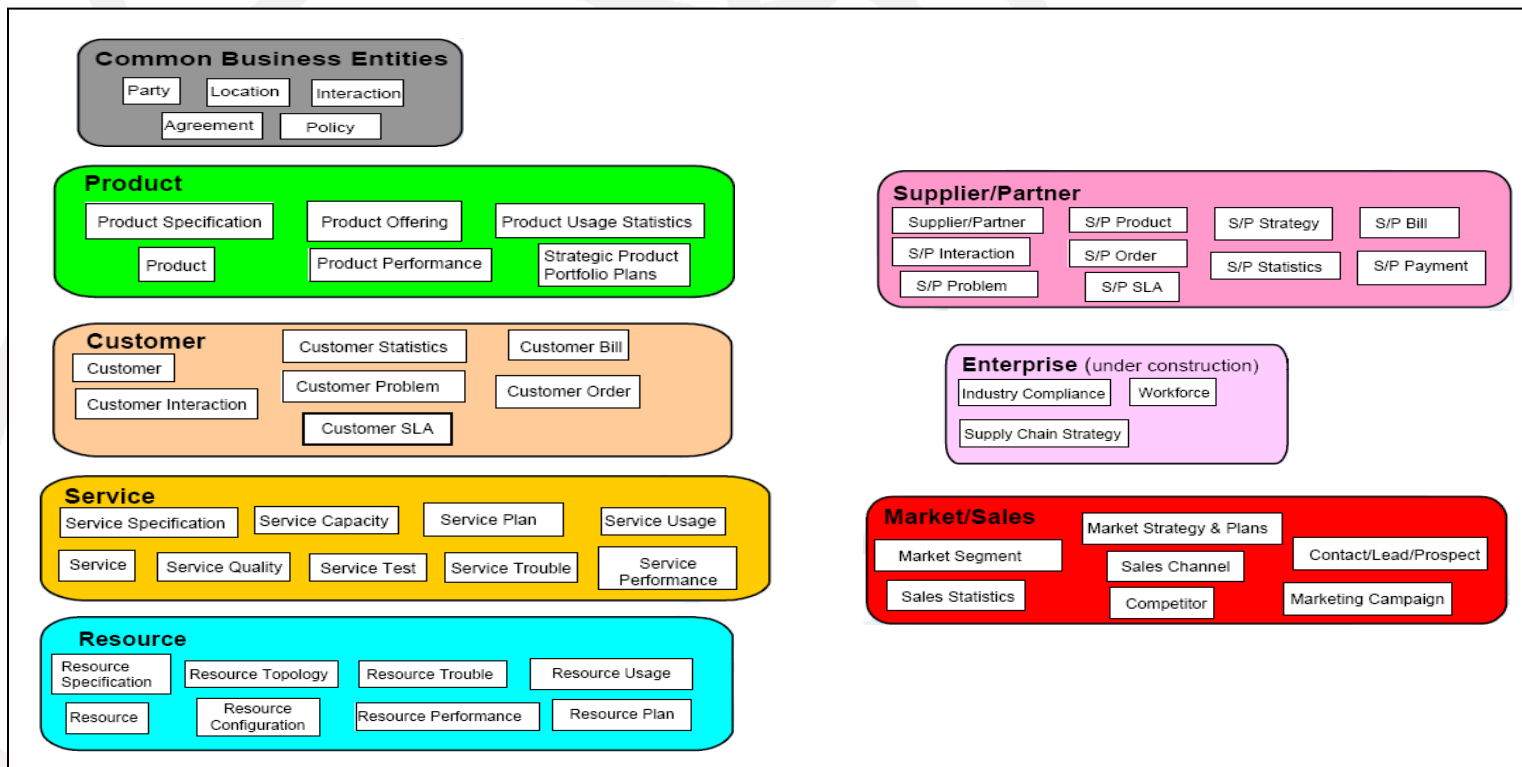
Common Information Model (CIM)

CIM developed by the Distributed Management Task Force (DMTF)

- CIM is an Information Model that describes the management aspects of Services and Resources at various levels of abstraction and decomposition.

- CIM provides description of the end-to-end managed environment using standardized semantics that can be specialized and extended.

- Is an object-oriented information model and is independent of applications, platforms, protocols and implementations.

- CIM primary focus is the IT resource management (Systems, Storage) and IP Networks.

- CIM provides a low-level abstraction of management information of network and system components.

- CIM structure allows it to be directly transformed into the Data Model for implementation without paying performance penalties for high level of normalization.

LDAP: CIM-SID Harmonization

- The SID/CIM/LDAP model can be considered for the creation of Directory Services to enable service discovery in the SOA and services will be described using WSDL.
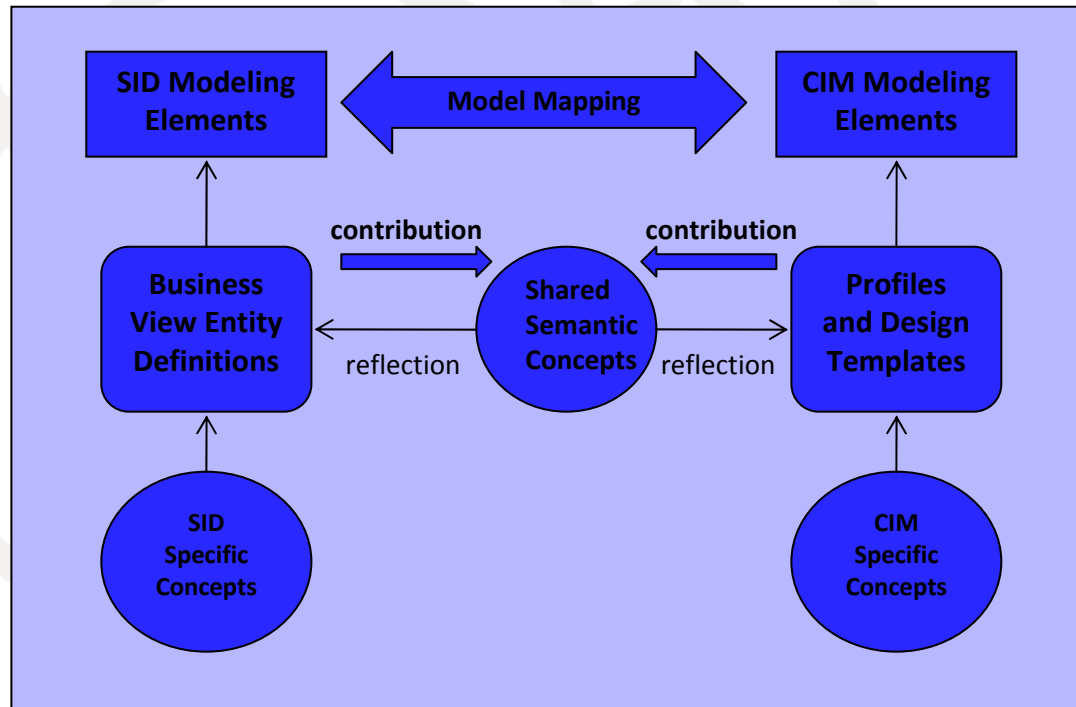
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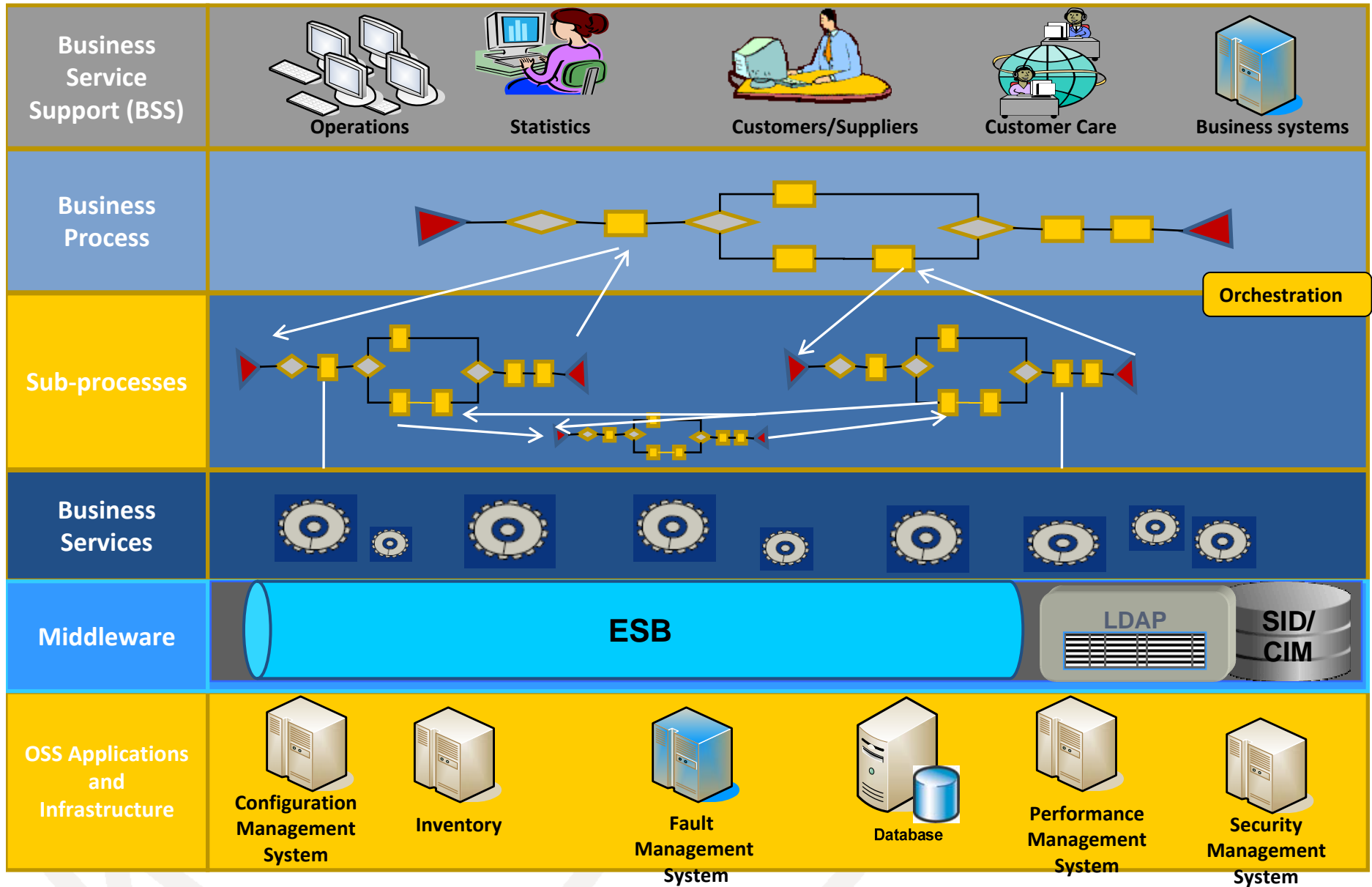
Conclusion

- The Management architecture for NGNs according to the ITU-T M.3060 NGOSS recommendation is presented.

- The basic architectural view was described, giving more emphasis on the functional architectural view of the management plane.

- Service Oriented Architecture concept was introduced as well as the Web Service paradigm, in order to illustrate the benefits of that technology which is the enabler of the SOA philosophy.

- LDAP is proposed for SID/CIM harmonisation

Thank You

Any questions?