

An Architecture to Develop Network Management Standards

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Purpose:

This presentation outlines an architecture for developing protocol neutral network management standards

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Operators

2 types of likely IEEE 802.16 Operators

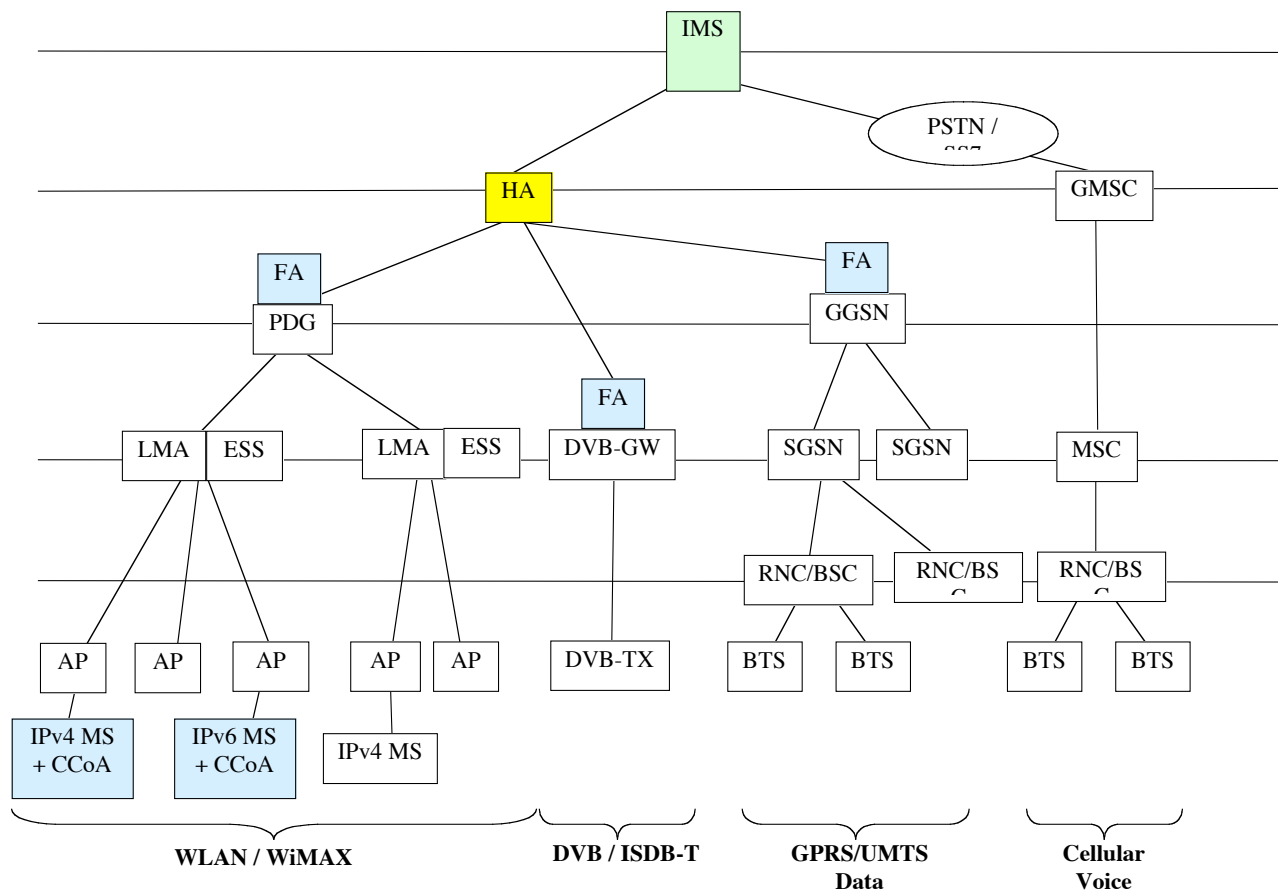
1. Incumbent Wireless

- The operators already have at least one type of wireless technology e.g. cellular, 802.16a, DVB, etc.

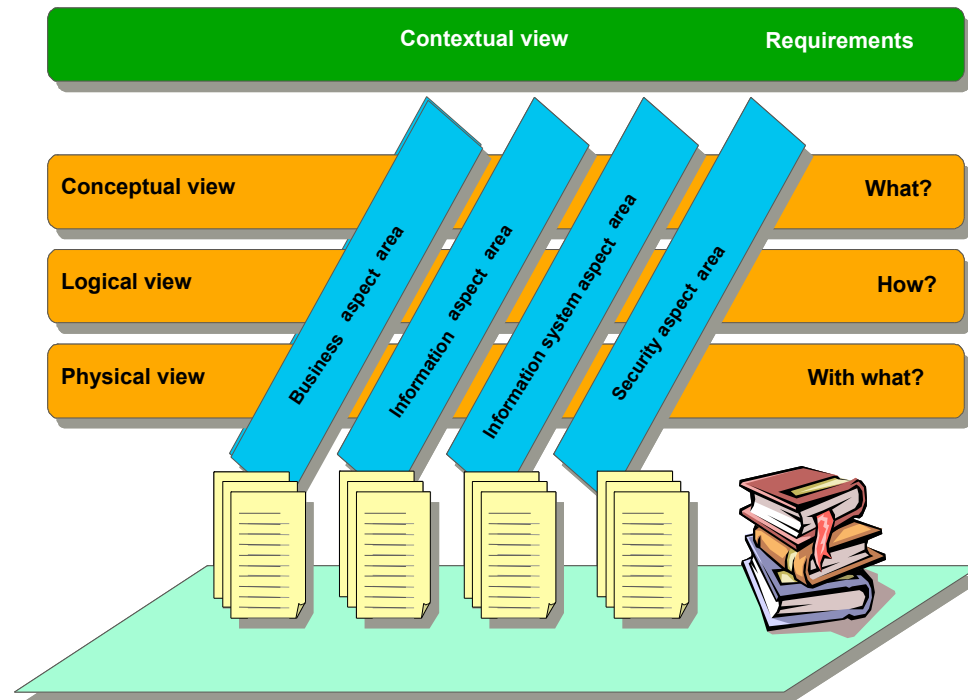
2. New Wireless, Incumbent Wired

- These operators have networks but are adding new wireless access nodes such as IEEE802.16

Operators will desire a single system to manage their different networks

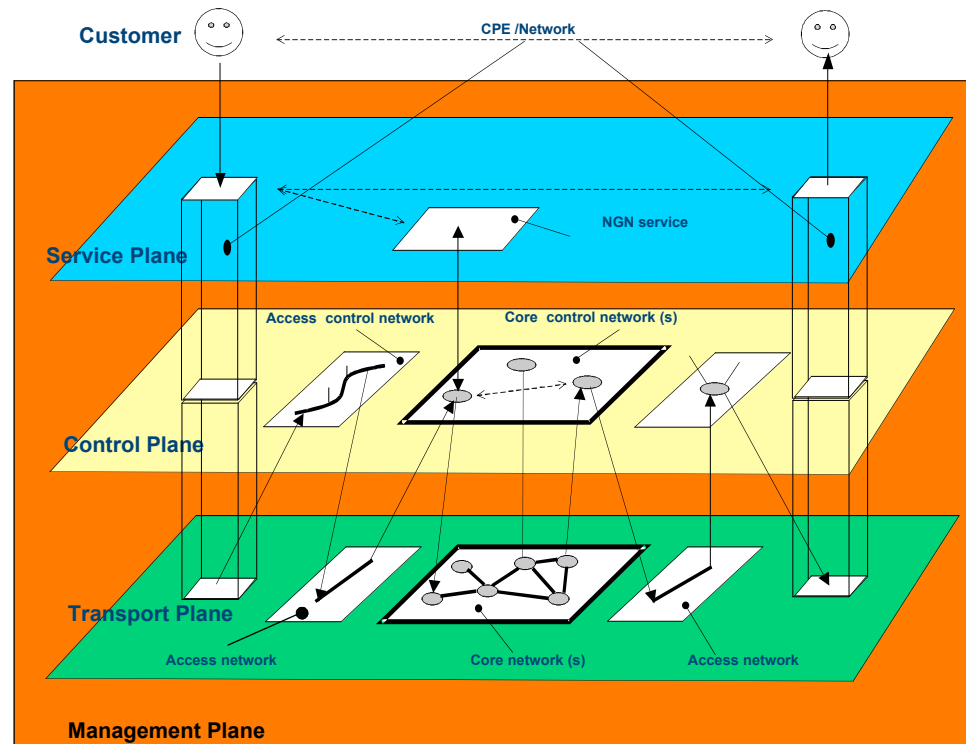


Architectural View of Management Systems



- Contextual view
 - This view describes why
- Conceptual view
 - This view describes what functions are needed
- Logical view
 - This view describes how functional realization of what is needed

Conceptual View of the Management Plane



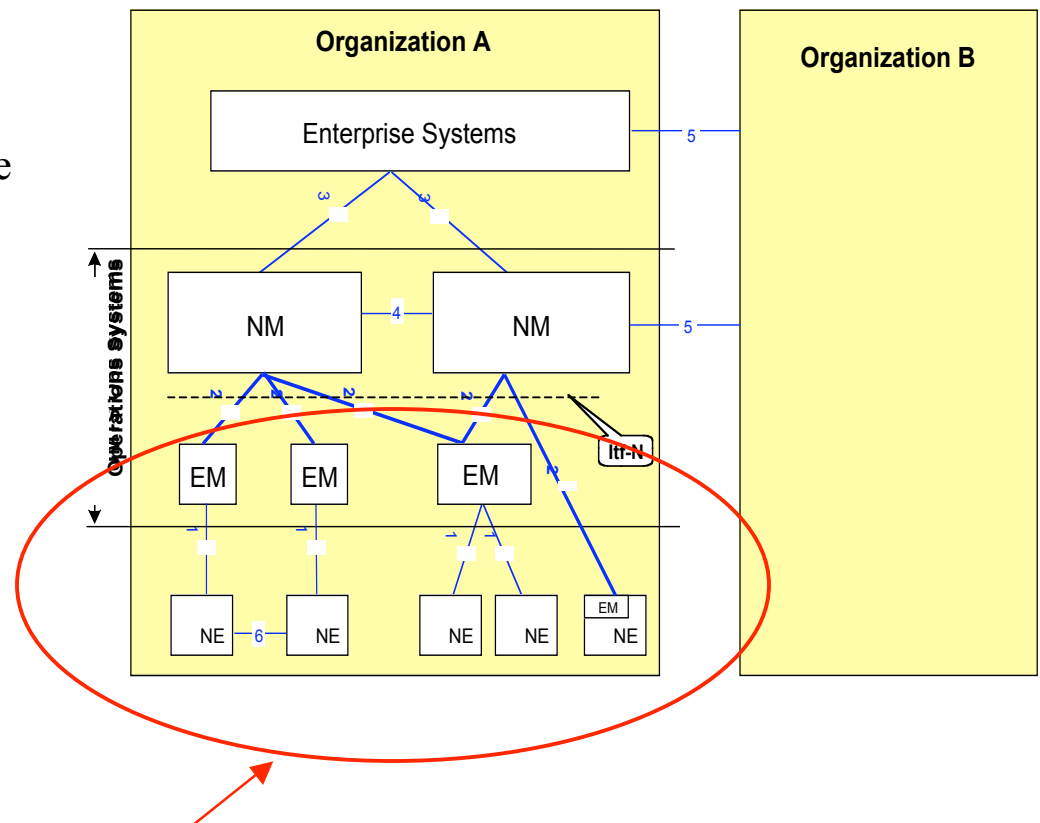
In the management plane we can subdivide the organizational part into three distant stratum that 802.16 access networks will have to interoperate with

Advantages of this Architectural Approach

1. Hide complexity
 - By decoupling specification from implementation, the attention can be put on one subject independent from the other. Using this approach, the “what” problem can be solved without having to define “how” the eventual implementation will be done.
2. Enhance reuse
 - Because of the reduction in complexity it will be easier to get a clear picture of the overall functionality. The overall functionality can then easier be separated into potential reusable parts. As a result, reuse of existing parts will become easier.
3. Increase flexibility
 - Separation of functional areas allows for more flexibility. The implementation of the functionality can be modified (provided that the functionality itself does not change) without having any impact on applications that are dependent on the functionality. By modifying one part at a time, migrations to new technical standards can be achieved step-by-step.
4. Isolate changes
 - By separating specification from implementation, the implementer is able to change the implementation with minimal impact on other users/organizations.

Types of Network Management Interfaces

1. between the Network Elements (NEs) and the Element Manager (EM) of a single broadband wireless network;
2. between the Element Manager (EM) and the Network Manager (NM) of a single broadband wireless network;
3. between the Network Managers and the Enterprise Systems of a single broadband wireless network;
4. between the Network Managers (NMs) of a single broadband wireless network;
5. between Enterprise Systems & Network Managers of different broadband wireless network;
6. between Network Elements (NEs).

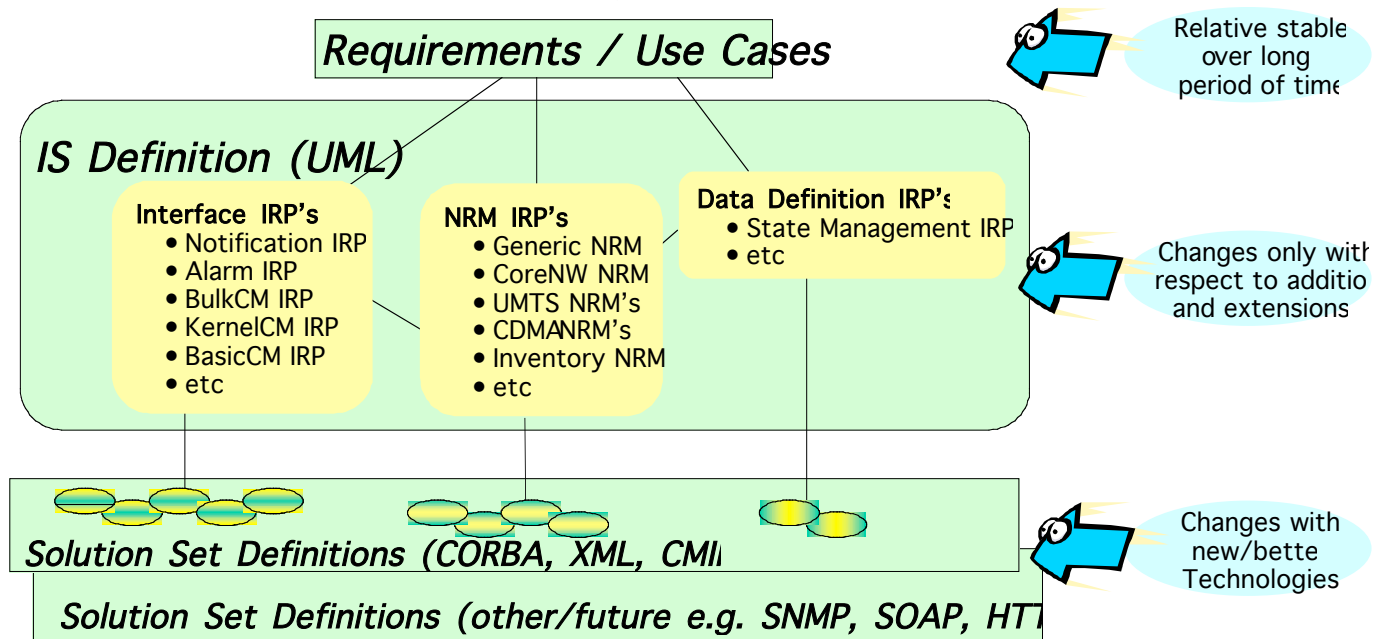


NETMANs Focus

Information Reference Point (IRP) Approach Methodology

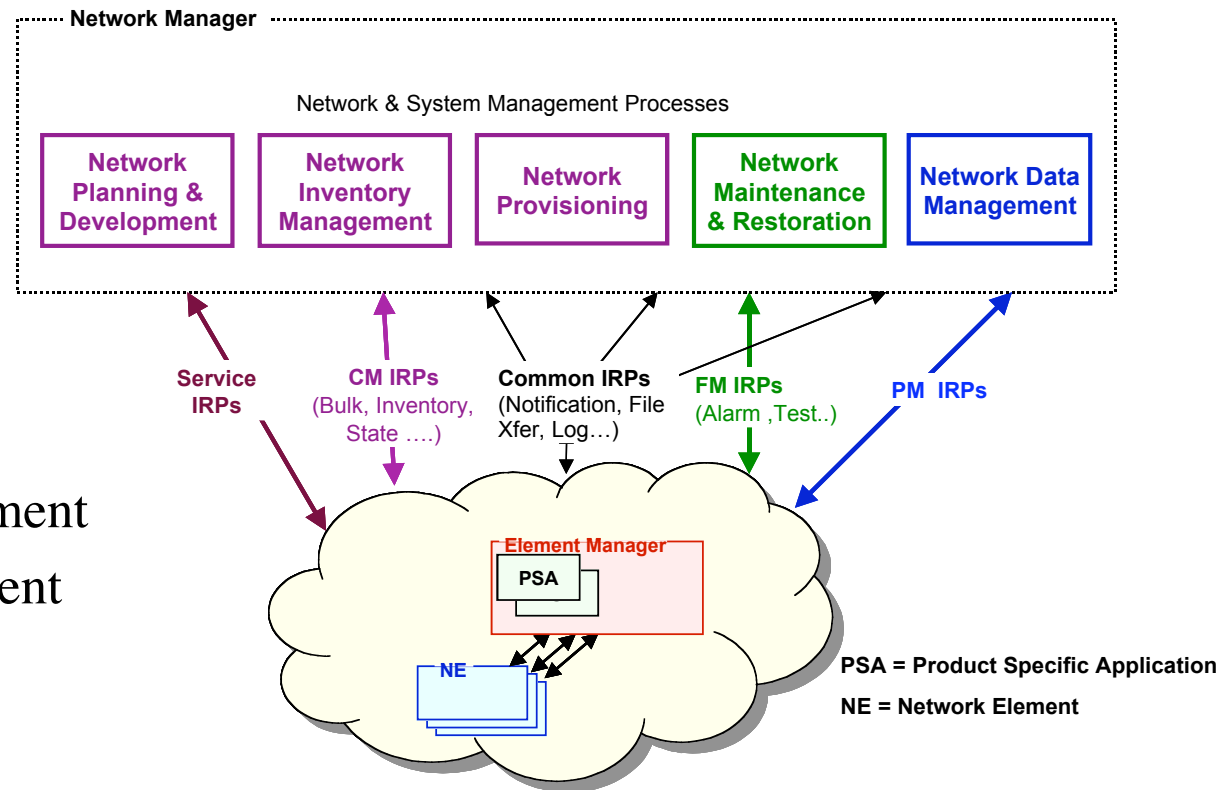
1. Top-down, process-driven modeling approach
 - The process begins with a requirements phase, the aim at this step is to provide conceptual and use case definitions for a specific interface aspect as well as defining subsequent requirements for this IRP.
2. Technology-independent modeling
 - The second phase of the process is the development of a protocol independent model of the interface. This protocol independent model is specified in the IRP Information Service.
3. Standards-based technology-dependent modeling
 - The third phase of the process is to create one or more interface technology and protocol dependent models from the Information Service model. This is specified in the IRP Solution Set(s).

Three Types of IRPs



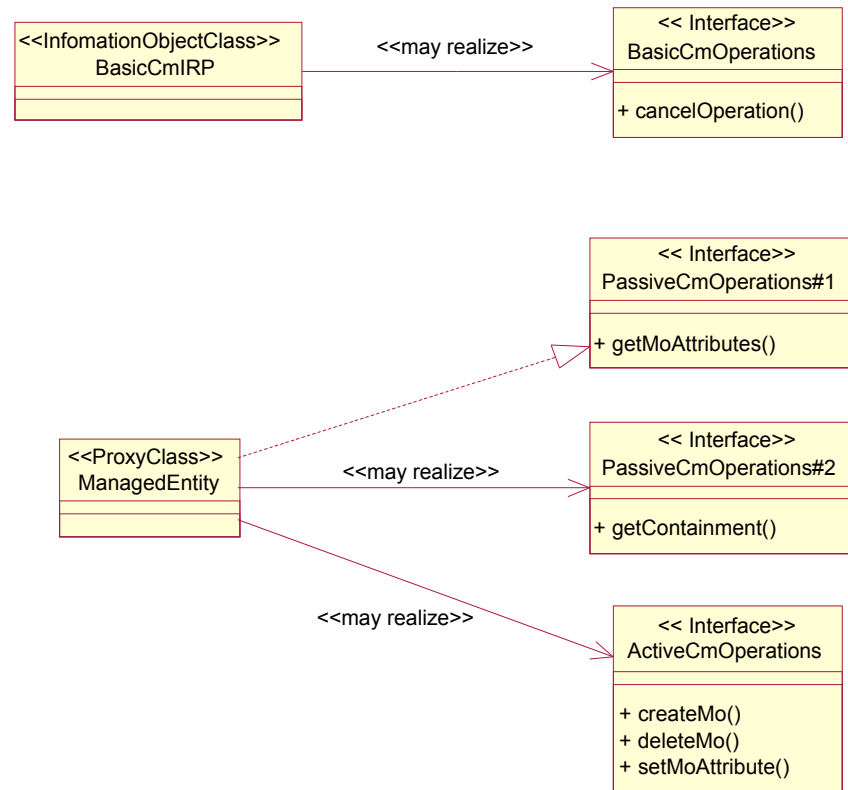
1. Interface IRPs – These typically provide the definitions for IRP operations and notifications in a network agnostic manner. These enable independent development as well as reusable across the industry
2. NRM IRPs – providing the definitions for the Network Resources to be managed (commonly named "Network Resources IRPs"). These enable technology & vendor specific NRM extensions
3. Data Definition IRPs – provide data definitions applicable to specific management aspects to be managed via reusing available Interface IRPs and application to NRM IRPs as applicable. These enable a wide applicability, phased introduction capabilities & broad industry adoption.

IRP's FOR APPLICATION INTEGRATION



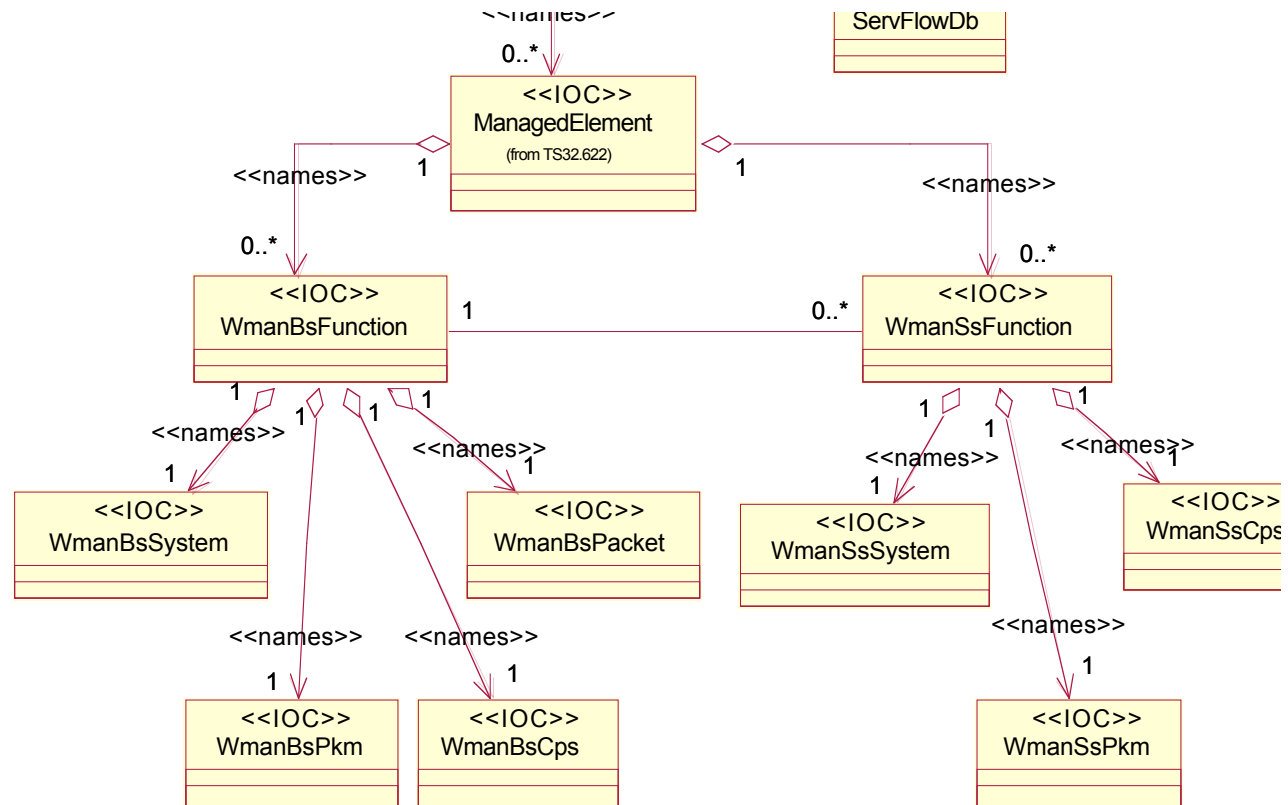
- Alarm Management
- Configuration Management
- Performance Management
- State Management
- Inventory Management
- Test Management
- Log Management
- Security Management
- Subscription Management

Basic CM IRP Information Service (IS)



1. IRP IS specifies a number of protocol-independent operations that are needed by an IRPManager to retrieve CM information from an IRPAgent as well as to enable provisioning of network resources
2. Once Defined object definitions can be developed and then mapped to a protocol

Sample NRM IRP For 802.16f



Cooperation

The NRM describes the specifics of the network to be managed. This modular approach has enabled different organizations to re-use the Interface IRP's, and even some of the high-level, network-technology independent NRM IRP's



- 3GPP defines standard NBIs
- 3GPP2 re-uses 3GPP's NBI specifications
- *One set of NBI standards for all 2G, 2.5G and 3G wireless technologies!*

Conclusions

- The IRP Interface Methodology give a standards developer, vendor, and operator:
 - modular, re-usable, protocol neutral NM specifications
 - ability to quickly change protocols when necessary,
 - take technology and adopt into different deployed networks and
 - have it interoperate seamlessly.
- Advantages
 - Hide complexity
 - Enhance reuse
 - Increase flexibility
 - Isolate changes
- Implementers of the network management systems will have the choice as to whether they desire to use SNMP, XML, SOAP, HTTP, CORBA, JAVA, etc. based on their particular need.
- The benefit to developers of both the systems and the standards are that as protocols are revised the information contained in a standard would not need to concurrently updated and revised.