



**Working Group:  
“Future Internet visions and  
their impact on Network Management“**

**Scenario: IP stays at it is,  
and evolution happens around IP**

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3 July 2008



## The Basic Idea of this Working Group

- This working group addresses the implications on management for a Future Internet in which evolution happens around IP, while IP stays almost as it is.

This is called “**Evolutionary Internet**”

- Services to be supported but this evolutionary Internet
  - Basic “best effort service” by the Internet
  - Possibly additional services
    - Fault tolerance
    - QoS
  - FCAPS management capabilities
    - This includes security
  - Possibly, Self-\* capabilities are provided and supported by
    - Context-awareness
    - Policy-based management



# Assumptions of the Evolutionary Internet

- Assumptions:
  - Core network
    - There will be sufficient bandwidth available in the core network, assuming optical network technologies
    - The operator of the core network offers a simple data forwarding interface and does not want to expose management capabilities to its customers
  
  - Access network
    - The bandwidth of the access network may vary, e.g. in the case of a wireless access network
    - Additional functionality is needed for a node to operate adequately in such an environment, e.g. with resource constraints, or changes in connectivity in a wireless environment



## Requirements on Management

- Scenario implies requirements on relationship between layers:
  - There is management below the IP layer, e.g. managing a Metro-Ethernet, or managing wireless access networks
  - There is management at the IP layer.  
This management must be aware of what happens below.
  - There is management of functionality above the IP layer.  
This management must be aware of what happens below.
- ⇒ management of each layer should be aware of management of layer below
  
- Requirements:
  - Interdependencies between layers, and between management capabilities must be regarded
  - Management functions should be aware of what is happening below
  - Management functions must be fast (faster than a human being)



## More requirements to the Management Plane

- Which properties of the Internet in the Future must be considered?
  - Sensor networks need to be deployed
  - Vehicular networks need to be deployed
  - Formation and release of dynamic and self-interested communities
  - Expected growth in number of devices
  - Decentralized service provisioning
  
- ⇒ The latter two represent specific drivers for automated configuration and other management functions



# The Concept of Automated Management

- Management features expected in the future Internet
  - Automation: having static logic in an algorithm that specifies how to handle different situations
  - Self-management: A device should be capable of configuring itself based on specific guidelines so that the actors of the service provisioning are enabled with some degree of autonomicity.



# Why do we need Automated Management (1)

- Statements related to the growth of devices, e.g. in the “Internet of Things”
  - As the number of devices will grow dramatically, and as capabilities of humans for managing the network are limited, the future Evolutionary Internet will feature
    - Relaxation of human intervention
    - Automation: may or may not part of self-management
    - Self-Management: as little human intervention as possible



## Why do we need Automated Management (2)

- Statements related to the scenario in which each node can be a service provider
  - This scenario is related to the concept of composable services.
  - Individuals that want to offer services may not have knowledge or time to manage.
  - Interactions of millions of service providers must be possible.
  - The management should allow decentralization.
  - Logic is pushed into each device.  
Each device should ensure support of overall objectives
  - Management should allow delegation to the elements, i.e. the nodes should have autonomic capabilities.