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Directory Enabled Networks a new trend in Networking?

LDAP Deployment BoF

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Agenda

- Working groups involved
- Basics of DEN
- Common Information Model (CIM)
- Quality of Service (QoS)
- Policy

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DEN Ad Hoc Working Group

- http://www.murchiso.com/den
- Initiative of Cisco and Micro$oft
- 70 other companies involved
- Customer Advisory Board
- DEN Workshop November 1997
- Last version of specs: “Directory Enabled Networks - Information Model and Base Schema”, Draft v3.0c5, 28.9.1998
- September 1998 handing over to DMTF

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DMTF

- Distributed Management Task Force
  - originally: *Desktop* Management Task Force
- http://www.dmtf.org
- Industrial group for the development of “management standards”.
- Works on the Common Information Model (CIM) since September 1996.
- DEN is now based on CIM.
- CIM Specs V2.2 include DEN enhancements

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IETF WG policy

- Policy framework
- http://www.ietf.org/html.charters/policy-charter.html
- BoF August 1998 (42 IETF Chicago)
- Aim is to define an LDAP information model based on CIM/DEN for the definition of routing policy to provide Quality of Service

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QoS Forum

- http://www.qosforum.com
- Industrial group for the deployment of different QoS standards
- Knowledge transfer and marketing done by a company named Stardust Forums

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Basics of DEN

- Information model for network elements and services
- LDAP as repository
- Description of how network elements and services act
- Definition of management methods and relations
- Directory becomes common data repository for network applications

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Basics of DEN (contd.)

- **John Strassner (Cisco):**

  "Directories unify information, and DEN binds users and applications to network elements and services. It is a blueprint that defines how to build networked business using an information model that guarantees interoperability of information across devices and vendors"

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DEN applications

- **Scalable configuration management for Network elements (router, switches): The devices will not be configured manually but will retrieve the configuration data from the directory automatically.**
- **Policy controlled network: Rules for the behavior of the network will be retrieved from the directory.**

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CIM basics

- Object oriented meta model
- Based on Unified Modeling Language (UML)
- Three layers:
  - core model: minimal set of classes, relationships and qualities as basic vocabulary for all management fields
  - common model: Set of classes, defining 4 separate groups: systems, applications, networks and devices
  - extension schema: Extensions of the common model specific to different technologies (vendor dependant e.g. OS)

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CIM entities

- Schema: a group of classes.
- Class: Group of instances, that support the same type. Classes have Qualities and methods and can be part of relations.
- Quality: Value that characterizes the instance of a class and that contains status information.
- Method: declaration of a method name, the typ of the return value and parameters.
- Trigger: detection of the change of status of a Quality.
- Indication: a class caused as side effect of a trigger.
- Relation: a class consisting of two or more references.
- Reference: defines the role of an object in a relation.
- Qualifier: values with additional information about classes, relations, etc. A Q. Has a name, type, value, range, flavor and default value.

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Quality of Service

- QoS is the ability of a network element to provide a defined bandwidth.
- This gets more and more important for things like voice over IP and multimedia services.
- There are two types of QoS:
  - Reservation of resources (integrated services), e.g. RSVP (ReServation Protocol)
  - Prioritizing (differentiated services), e.g. DiffServ at network layer
- QoS can be applied to single data packages or groups.
- Different QoS technologies can be applied together.
- QoS protocols presuppose rules (policy).

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Policy

- Policy is one or more rules, which describe actions that follow specific conditions
- The model developed by the IETF policy WG is applicable to other technologies like firewalls, IP security, Virtual Private Networks (VPN) etc.

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Policy architecture

- Policy Enforcement Point (PEP): the network element where policy is executed (router, switch).
- Policy Decision Point (PDP): The place where policy is retrieved from the directory, interpreted, conflicting rules spotted and requests from the PEP answered.
- Policy repository: The directory with policy information.
- PEP and PDP communicate with Common Open Policy Service Protocol (COPS).
- PDP and repository talk LDAP.

Policy architecture (contd.)