Toward the Definition of Virtual Network

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Current status

- IETF 78&79
  - Discussion about the concept and definition of VN
  - No strong consensus
- Mailing list discussion
  - VN vs. VPN
  - VN vs. overlay network

Intro.

- A data communications system which interconnects computer systems at various different sites [RFC 1983]

- A collection of computers and devices interconnected by communications channels that facilitate communications and allows sharing of resources and information among interconnected devices [Wikipedia]

- A set of nodes and links that provide connections between two or more defined points to facilitate telecommunication between them [Y.101]

A rough definition of VN

- Rough definition
  - VN is an interconnection of virtual nodes and virtual links
- Important properties of VN
  - Each resource can be used concurrently by multiple VN instances
  - Clear isolation of any VN from all others,
  - Abstraction, in which a given virtual resource (host, link, router, service) need not directly correspond to its component resources

Virtual link requirements

- Slicing of physical link
- Isolation among virtual links
- Protocol agnostic
- Dynamic change of virtual link's capability
- Dynamic instantiation
- Aggregation
- Management of virtual link
- Independent addressing
- Access control
- Recursiveness

Virtual node requirements

- Slicing of physical node
- Isolation among virtual nodes
- Member of multiple VNs
- Dynamic change of virtual node's capability
- Dynamic instantiation
- Attached to multiple virtual links
- Management of virtual node

Some acid tests

- Can virtual node concurrently join multiple VNs?
  - Generally, a host can join only a single VPN
  - Virtual node can join multiple VNs

- Can virtualize address space?
  - Can two VNs use the same address space?
  - Can a VN use the same address space as the physical network?

More acid tests

- Is control between VNs isolated?
  - For example, different VNs may use different routing protocols

- Is control between physical network and virtual network isolated?
  - For example, a VN can use its own routing protocol different from protocols used in physical network

More acid tests

- Can a VN perform access control to its members?

  – Prevent unauthorized access to the VN

- Can VN's characteristics be dynamically changed?

  – VN topology, bandwidth of virtual link, creation of new virtual link, …

Way forward

- Reach rough consensus about VN's definition