MANTICORE: Providing Users with a Logical IP Network Service

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MANTICORE Partners (self funded project):
Agenda

• MANTICORE vision…

• MANTICORE-I implementation
  – Infrastructure as a Service framework…
  – Software architecture…

• MANTICORE-II…

• Influence on end-to-end service…
MANTICORE vision

Each user’s IP network is represented by a different color

Other user’s IP network or the Internet
MANTICORE use cases

NOC

Users
Routing integrity
Logical IP Network Service

• Define the edge ports of the IP network
• Define the external Routing Service (policy)...
• In case there are preferences on internal transport services; provide QoS and internal Routing Service metric
• Provide IP address pool (guided by your ISP)
Benefits

- On-demand (self definable/WS) IP network
- Incorporating integrated route policy and thus increased route integrity
- Nothing new compared to VPNs:
  - Share physical routers/links; not buying your own
  - No self-assembly required
- Drawn back: need of this control plane
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Infrastructure as a Service Framework

- Virtualization of workstations
- Software as a Service (SAAS)
- Infrastructure as a Service (IaaS)
Implementations of IaaS Framework

- ARGIA -> Product for Optical Networks
- ETHER -> R&D for Ethernet and MPLS Networks
- MANTICORE -> Logical IP Network Service
- GRIM -> R&D for Instruments and Sensors
Infrastructure resource trading

Provider 1 → User A

Provider 2 → User A

Resource List

User A

Resource List

User B

Resource List

User C

Resource List
MANTICORE-I implementation

• Based on Juniper routers using the Netconf JunOS XML API

• An abstract routing language is not used as a means of describing routing configurations (instead, a proprietary simple and limited representation is used).

• The implementation is not a complete solution: working prototypes of the services is implemented, and some features and performance optimization are left for future work.
MANTICORE-I Logical IP network
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MANTICORE II new features (1/2)

• Allow and detect manual configurations and allowing selected resource for other systems (isolation)

• Abstract the internal/external routing policy

• Support for other manufacturers (i.e. Cisco)

• Integration of the enhancements made as part of FP7 FEDERICA project activities (e.g. Xorpsh CLI)
MANTICORE II new features (2/2)

- Add more features to the IP Network WS
  - Ability to set up VPNs
  - Ability to set up bandwidth guaranteed paths in the IP Network
  - Firewalling, Access list

- Integration with other IaaS based solutions, e.g.:
  - ARGIA (optical networks: TDM, WDM, fibre)
  - ETHER (Native Ethernet and MPLS VLL networks)

- Authentication/Authorization

- This is also an invite to join MANTICORE-II!
  Planned to start 1Q2009
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• Influence on end-to-end service...
Influence on end-to-end service (1/3)

• Deployable and SLA:
  – NREN services ends at Institute boundary
    Extending to other NREN (using GEANT+/DCN) is possible (if service available)
  – Institute’s responsibility to extend the local part to User (fibre, Ethernet, IP)
  – SLA for NREN service is available
  – SLA for local part is under Institute’s remit
Influence on end-to-end service (2/3)

- Acceptable Use Policy (AUP) and route integrity
  - AUP of NREN service is the *normal* NREN AUP with the Institute
  - AUP for the local service with User is under Institute’s remit
  - Unwanted route leaks with fibre/Ethernet need to be procedurally guaranteed (AUP)
  - Unwanted route leaks with logical IP network (aka AS) is more controllable
Influence on end-to-end service (3/3)

• Security and firewalling
  – Institute must have a scalable security/firewall configuration
  – fibre/Ethernet need to be procedurally guaranteed (AUP)
  – logical IP network (aka AS)
    • firewall could be part of the logical IP network service.
    • firewall managed by eligible party (Institute?)
Thank you!

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Additional agenda

- How does it work: GUI preview...
- Route Service e.g. using RPSL...
How does it work: GUI preview

Two organizations

- NREN-A: Physical Network (PN) Admin. In this very simple example it operates a network with one physical router.
- i2CAT: Virtual Network (VN) Admin. In this very simple example it will request two logical routers from NREN-A.

MANTICORE deployment:

NREN-A Server:
- User Workspace WS
- Ethernet Resource WS
- IP Network WS
- Router WS

i2cat Server:
- User Workspace WS
- Ethernet Resource WS
- IP Network WS
NREN-A discovers the physical router (1/2)

- When NREN-A first launches the GUI client, it must create a new physical network and add all the routers they want to manage to it.
NREN A discovers the physical router (2/2)
NREN-A PN Admin creates logical routers (1/2)

- Create logical interfaces
- Create logical routers
- Assign i/fs to routers

- Create tunnel between the logical routers
NREN-A PN Admin creates logical routers (2/2)
Giving permissions to links and interfaces

- PN Admin creates “resource list”
Exporting resources

- NREN-A PN Admin exports the resource list to i2cat (permissions are set on the resources so that i2cat’s users can access and modify the resources on the resource list).

- i2cat VN Admin, launches its GUI Client, logs into the server and downloads the resource list.
i2cat’s IP Network

- i2cat VN Admin creates a new IP Network and adds the resources of the received resource list.
Route Service e.g. using RPSL

aut-num: AS1213
as-name: HEANET
descr: HEAnet national network

import: from AS1299 # Telia [transit provider]
action pref=100 accept ANY
import: from AS3257 # Tiscali [transit provider]
action pref=100; accept ANY
import: from AS20965 # GEANT [private peer]
action pref=50; accept ANY

export: to AS1299 # Telia announce AS-HEANET
export: to AS3257 # Tiscali announce AS-HEANET
export: to AS20965 # GEANT announce AS-HEANET