

RIPE71 - IBNEMO BOF

Intent Based Network Modeling (IBNEMO)

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Gap between APP and Network

- **APP wants**

- **A connection between two sites**

- **A service flow with SLA**

- **A customer network service chain**

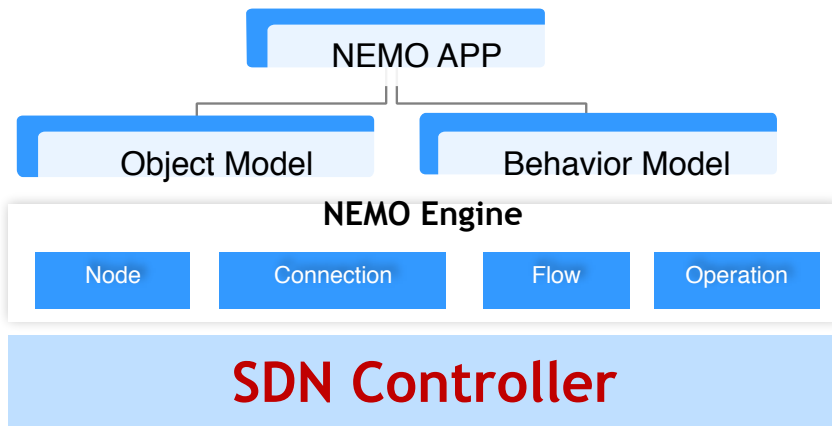
APP doesn't want

**Configurations of each device
between two sites**

Flow entries in each device

**Tunnel, ACL, PBR configurations
of different devices**

NEMO language for intent based network modeling



15 simple statement for hundreds of complex APIs

Resource Access	
Entity Model	node Node/UnNode entity_id Type {FN PN LN} Properties key1,value1
	link Link/UnLink entity_id Endnodes {node1_id,node2_id} Properties key1,value1,....
	flow Flow/UnFlow entity_id Match/UnMatch key1,value1 Range(value,value)
Policy and Event Handling	
Capability Model	Query Query key Value {value} From entity_id
	Policy Policy/UnPolicy policy_id Appliesto entity_id Condition {expression} Action { "forwardto" "drop" "gothrough" "bypass" "guaranteeSLA" "Set" "Packetout" "Node" "UnNode" "Link" "Unlink" }
	Notification Notification entity_id On key Every period Register.Listener callbackfunc
Model Definition	
Node definition	NodeModel <node_type> Property { <data_type> : <property_name> }
Link definition	LinkModel <Link_type> Property { <data_type> : <property_name> }
Action definition	ActionModel <Action_Name> parameter { <data_type> : <property_name> }

Network application/user use NEMO Language to programming their service

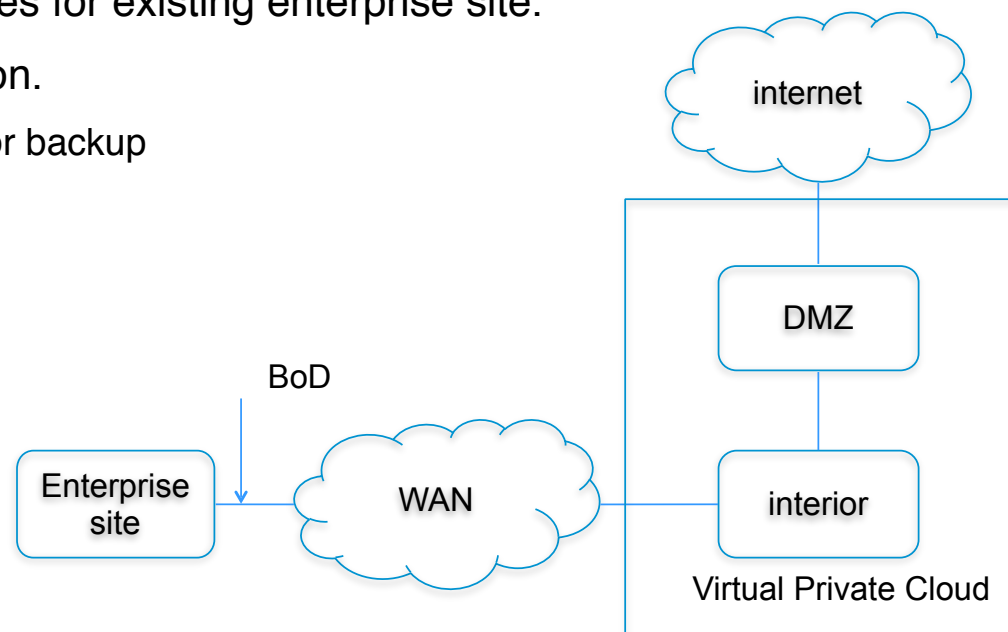
NEMO Language is an Intent oriented network DSL (domain specific language), which is a language style network open interface. Operator/End-user or 3rd party can use it to program network resource and behavior in their service applications.

NEMO Engine is a network middleware, which translate high level service intent to real network instruction base on MDA(Model Driven Architecture).

NEMO is now an OpenDaylight project coming with Beryllium release.
<https://wiki.opendaylight.org/view/NEMO:Main>

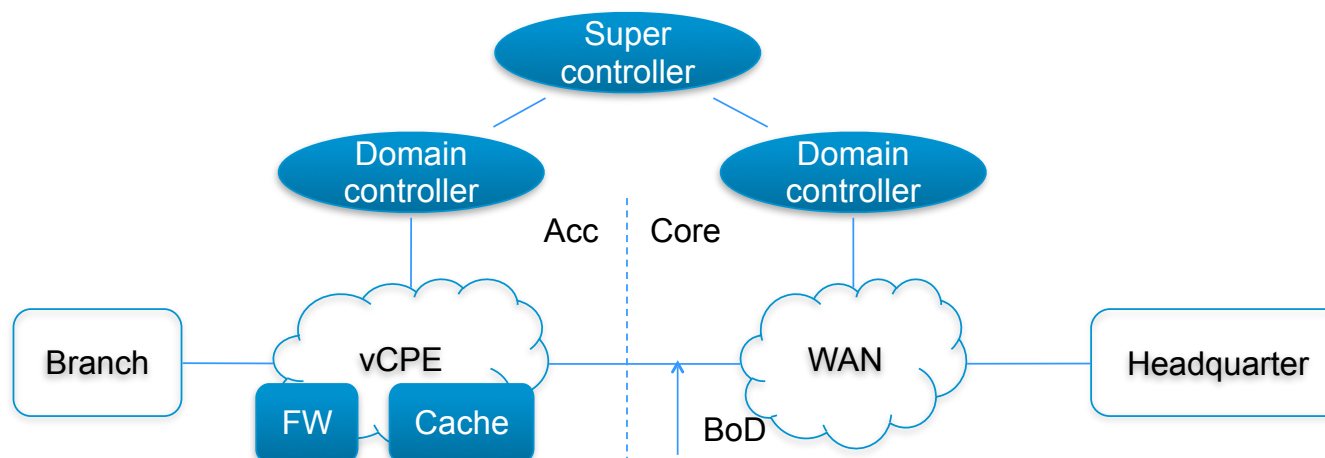
Use case : Virtual Private Cloud

- **Operator provide virtual private cloud service for enterprises.**
 - Need to allocate two zones in the VPC for security issue.
 - DMZ provide http/email/video services for access from internet.
 - Interior provide compute and storage resources for existing enterprise site.
 - Provide BoD capability on the WAN connection.
 - E.g, increase bandwidth when cloud bursting or backup



Use case: End to End Carrier Network

- **The enterprise outsources their CPE business to the service provider.**
 - The Branch site applies chained services in the vCPE before accessing WAN.
 - The enterprise requests BoD in WAN between the branch and the headquarter for different bandwidth requirements, e.g., day/work and night/backup.
- **The NEMO programmed logic runs on the Super controller and instruct domain controller to accomplish network service provisioning and policy applying.**



An Example: Bandwidth on Demand (B2B) DOCSIS

- There is a virtual link between the branch and headquarter offices.
 - The bandwidth of the vlink can be adjusted on demand
 - The adjustment can be triggered by "conditions" meet, e.g. The bandwidth will be adjusted when the timing meets.

NEMO Script:

Node branch;

Node HQ;

Connection tunnel **Type** P2P

Endnodes branch, HQ;

Constraint day **ApplyTo** tunnel

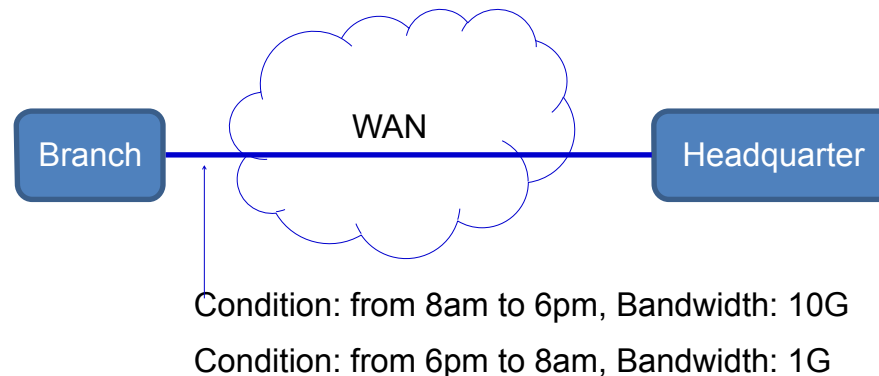
Condition time>8am & time <6pm

Operation set:bandwidth=10G;

Constraint night **ApplyTo** tunnel

Condition(time>0am & time<8am) | (time>6pm & time<0am)

Operation set:bandwidth=1G;



NEMO Editor in Eclipse

- Program a Eclipse plug-in that highlights the keywords
- Integrate with the IBNEMO project
 - Parse the NEMO language and compose the NEMO rest API.
 - Call rest client/lib to send the request.
- Reference:
- Hackathon implementation result: <https://github.com/paaguti-work/NEMO-IETF>

Why this BOF at RIPE71 ?

- Is IBNEMO of (potential) interest for Network Operators?
- Do you see immediate flaws/issues?
- Can you contribute use-cases
- Do you want to help with IRTF and/or IETF work on Intend Base Network Modelling
- Any questions you may have
- Do you at least want to participate in the discussion at
 - ibnemo@ietf.org mailing list
- Specifically we want to see operator input/ideas/comments
- Keep us honest and with 2 feet on the ground
- Do you want to play/experiment with early implementations

More Information/details

- mailing list ibnemo@ietf.org
- Open daylight Open Source: <https://wiki.opendaylight.org/view/NEMO:Main>
- Internet draft: <https://tools.ietf.org/html/draft-hares-ibnemo-overview-01>
- Related work in SUPA WG: <http://tools.ietf.org/wg/supa/>
- can contact/ask me at: bwietf@bwijnen.net

Thank You