

Note Well

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IB-Nemo

Agenda

- What is intent?
- What problem is IB-Nemo trying to solve
- Operators and Applications describe their problem
- Description of IB-Nemo
- Demo
- FAQ 5

What is Intent?

Prescription

- Bob wants two aspirin.
- Existing rule: Bob is not allowed to have aspirin
- Result: Bob gets nothing.



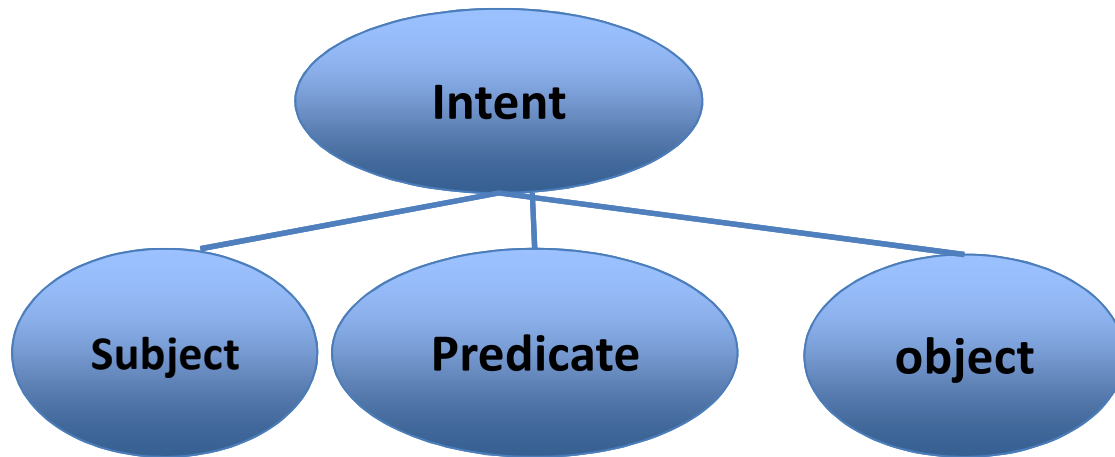
Ideas from HP's Intent slides

Intent (Declarative)

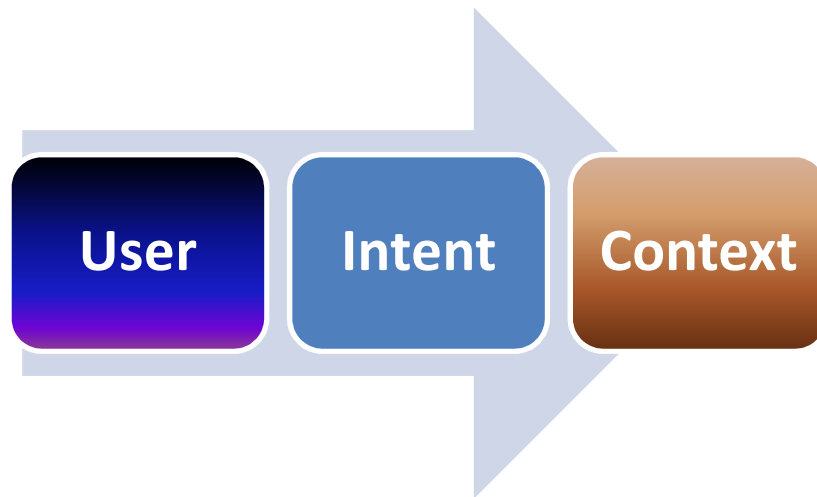
- Bob wants headache pain relief
- Existing rule: Bob not allowed to have aspirin
- Result: Bob gets acupuncture and his headache goes away.



Expressing Intent



Bob wants
headache relief!



Context:
Bob has had
headaches for
weeks

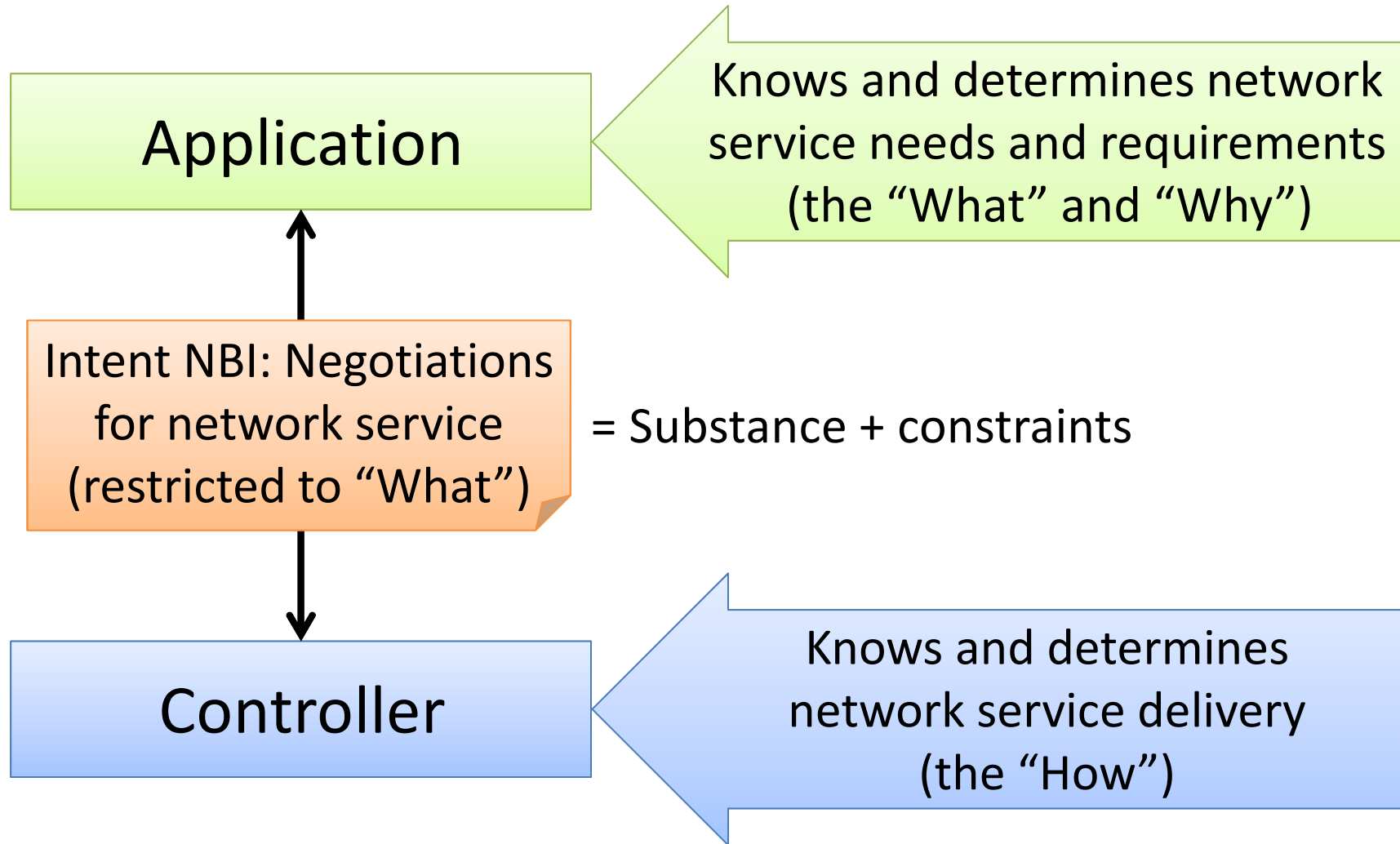
What is the problem?

- Problem 1: Applications want to express Intent rather than describe network
- Problem 2: Need user readable language to express for most applications
 - Stream of commands to run of http
 - Use Readable Commands (node, link, flow)

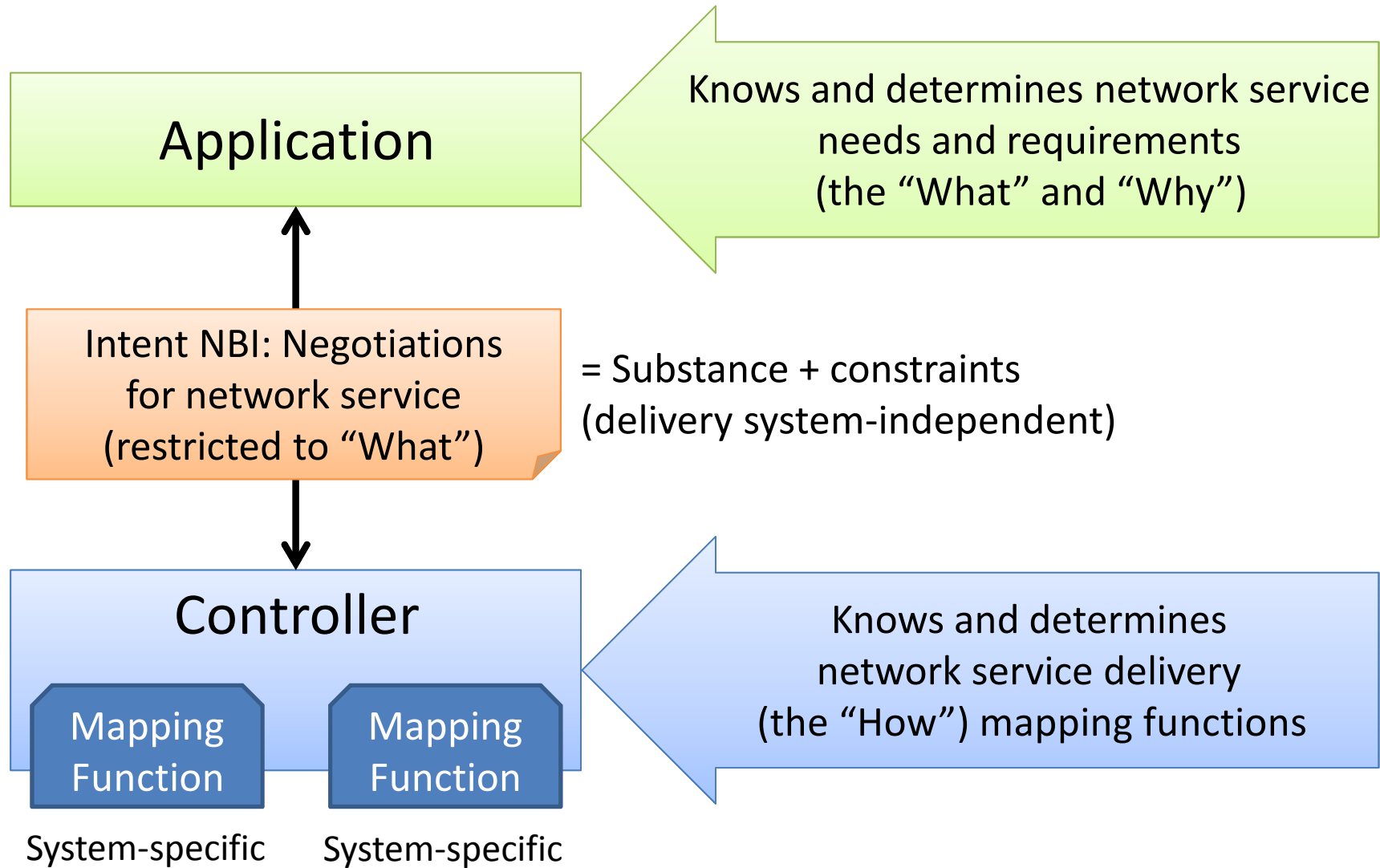
Question: scripts over http workable,

Not sure RESTCONF rpc + pub/sub level needed.

0. What, Why, and How



0. What, Why, and How & Mapping



1 simple intent comments

- Intent Command – with specification

Connection <name> **Type** <name> **Endnodes**
identifier1, identifier-2

- Definition of parameters of command
- **Node** identifier-1;
- **Node** identifier-2;

An Example: Bandwidth on Demand (B2B) DOCSIS

- There is a virtual link between the branch and headquarters (HQ) offices.

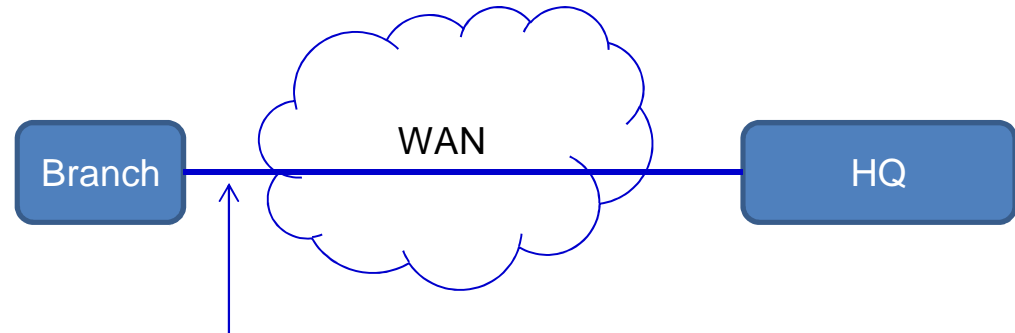
NEMO Script:

Node branch;

Node HQ;

Connection tunnel **Type** P2P

Endnodes branch, HQ;



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

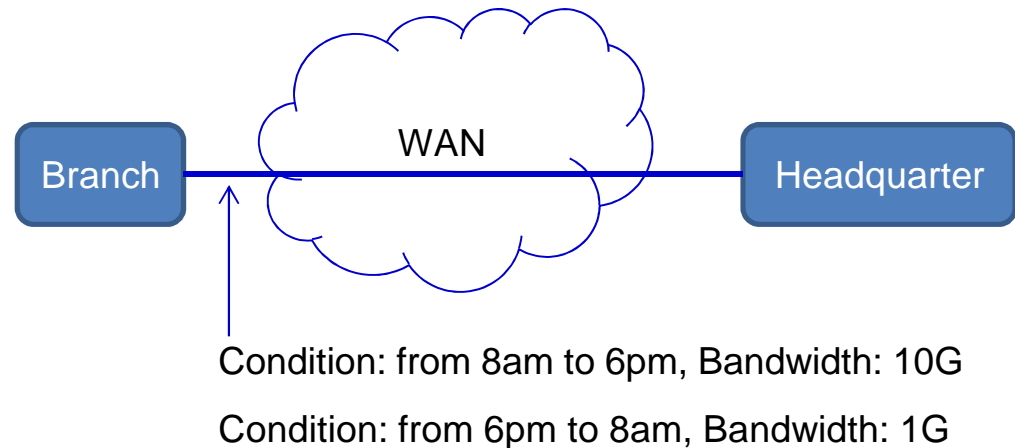
Condition time>8am & time <6pm

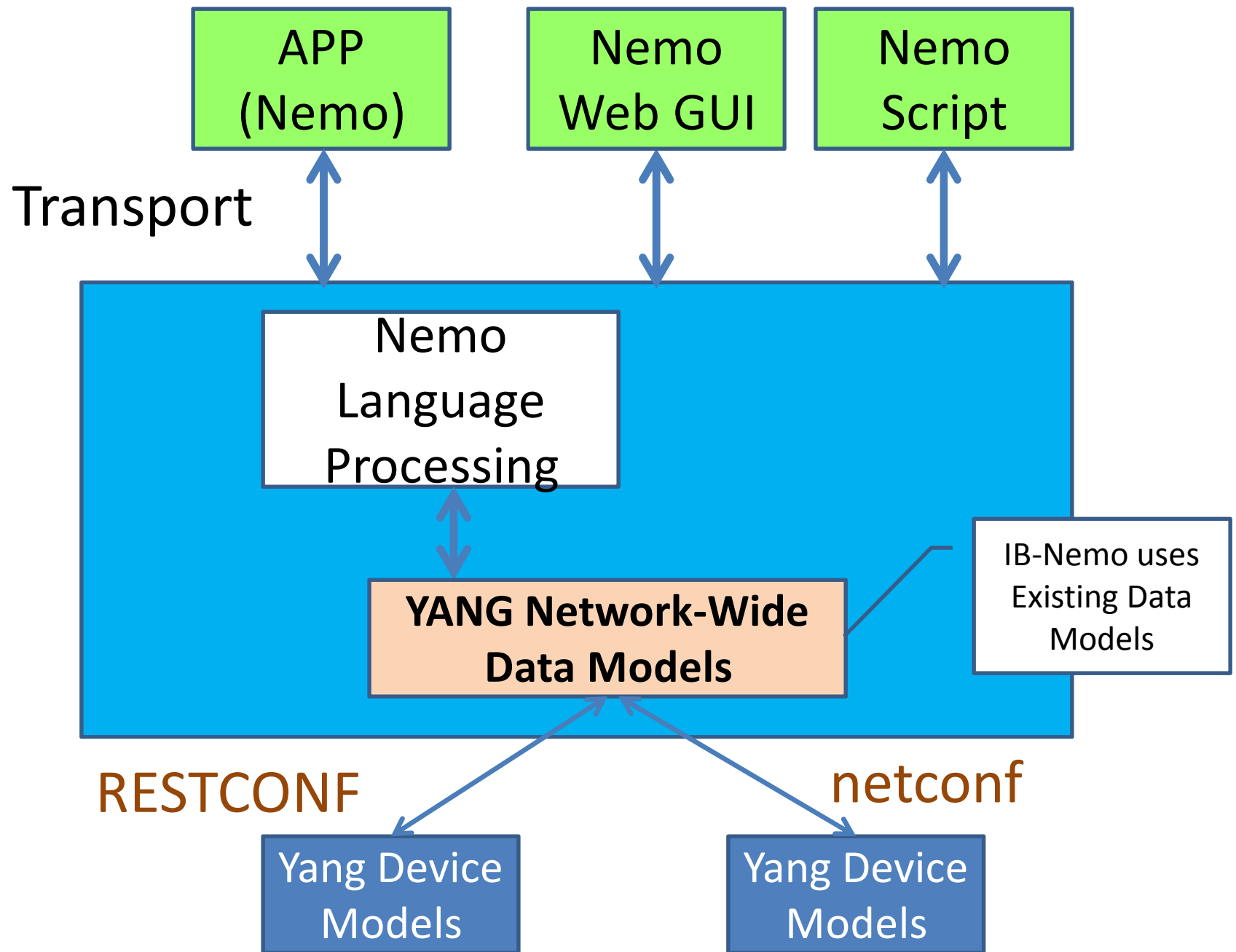
Operation set:bandwidth=10G;

Constraint night **ApplyTo** tunnel

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

Operation set:bandwidth=1G;





NEMO Script Language

Composed of

Resource Access

3 Primitive Groups

15

Statements

36 Key

Words

Object Model	Node	Node entity_id Type {FN PN LN} Owner node_id Properties key1, value1
	Connection	Connection entity_id Endnodes (node1_id,node2_id) SLA key,value Properties key1 ,value1
	Flow	Flow entity_id Match/UnMatch key1, value1 Range(value, value) Mask(value,value) Properties key1,value1

Operation Handling

Operation Model	Query	Query key Value {value} From entity_id
	Constraint	Constraint policy_id applies to entity_id Condition (Expression) Action { ["forwardto" "gothrough" "bypass" [Node Link]] [Unlink Link Node UnNode] } Commit / Withdraw
	Notification	Notification entity_id On key Every period RegisterListener callbackfunc

Extended Model Definition

**Notify &
Query
Allow to model
Definitions**

Node definition	NodeModel <node_type> Property { <data_type> : <property_name> }
Connection definition	LinkModel <Link_type>Property { <data_type> : <property_name> }
Action definition	ActionModel <Action_Name> parameter { <data_type> : <property_name> }

Use Cases

- Bandwidth on Demand - B2B or VPN case
- Virtual DC
 - Telefonica's Example
- SFC chaining
 - DOCSIS use case for parental control (put filter nanny in virtual path for filter)

Telefonica: DC Networks

- Create a virtual DC network with three parts: exterior Unsafe zone, DMZ zone, interior safe zone

User view

Network definition

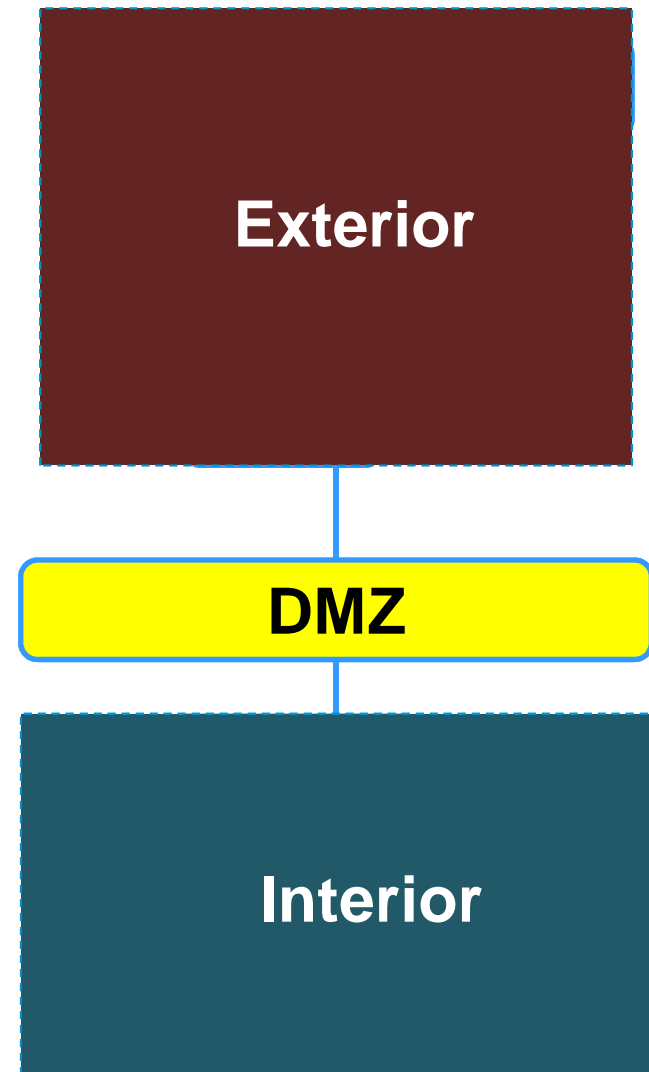
- Node exterior
- Node DMZ
- Node interior

Intent Command

Connection Customer1 **type** p2p

EndNodes Exterior, Interior

gothrough DMZ



Telefonica: DC Networks

- Create a virtual DC network for process of email traffic through firewall and spam filter before processing

Infrastructure

Network definition

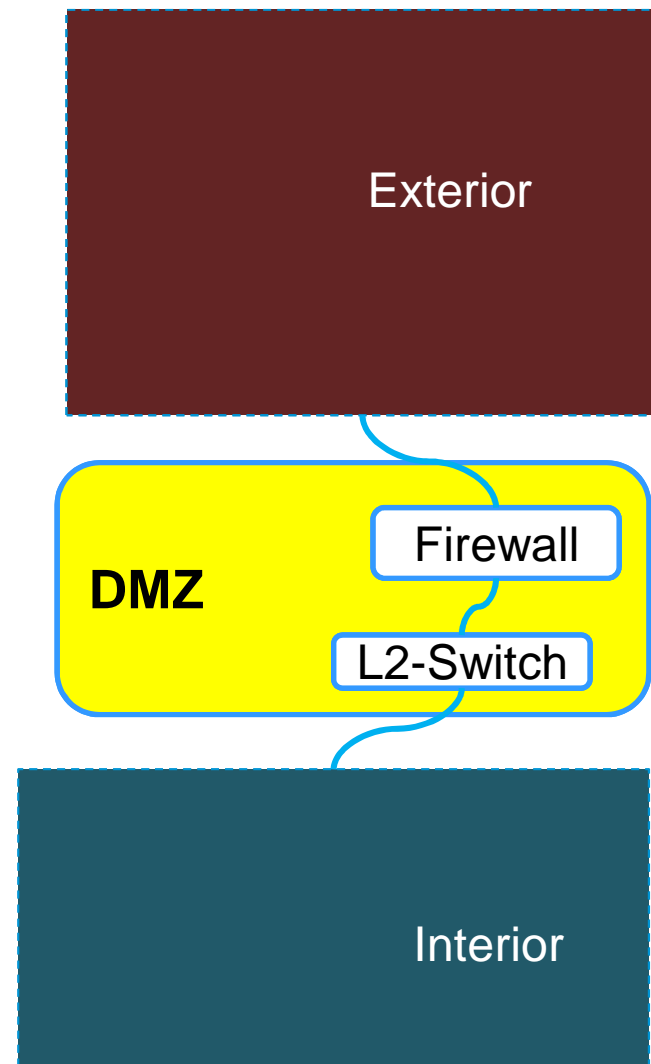
Host D-Firewall, D-router **node** DMZ

Intent Command

connection Customer1 **type** p2p

EndNodes Exterior1, interior

gothrough DMZ(firewall, L2-switch)



Telefonica: DC Networks

- Create a virtual DC network for process of email traffic through firewall and spam filter before processing

Infrastructure

Network definition

Host access-node, PC **node** exterior

Host D-Firewall, D-router **node** DMZ

Host PZ-router, email-server **node**

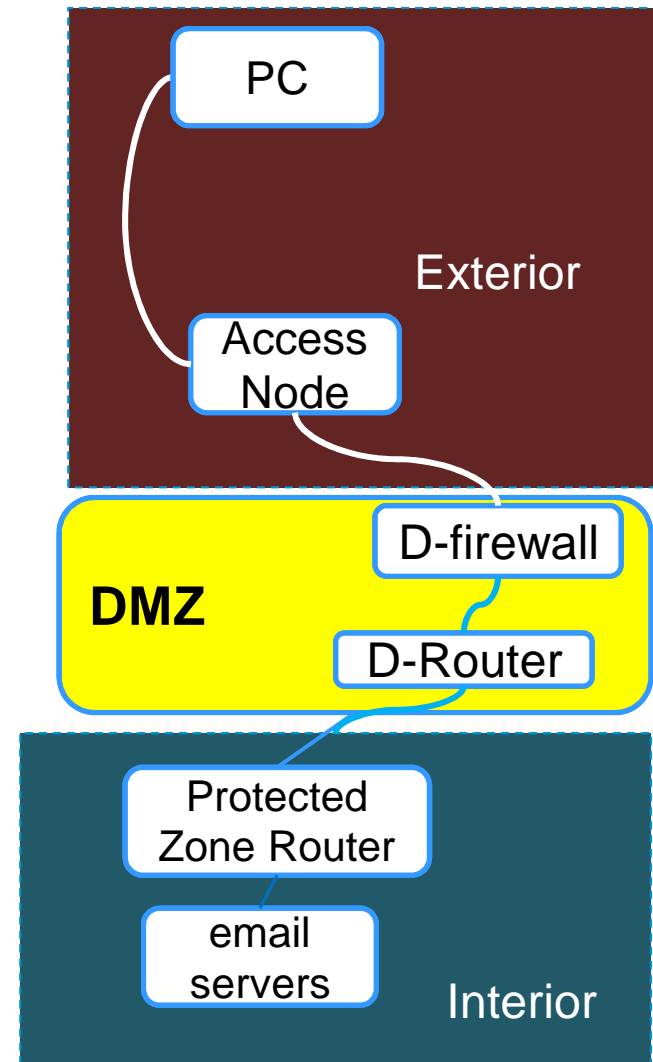
Interior

Intent Command

Connection Customer1 **type** p2p

EndNodes Exterior1, interior

gothrough DMZ

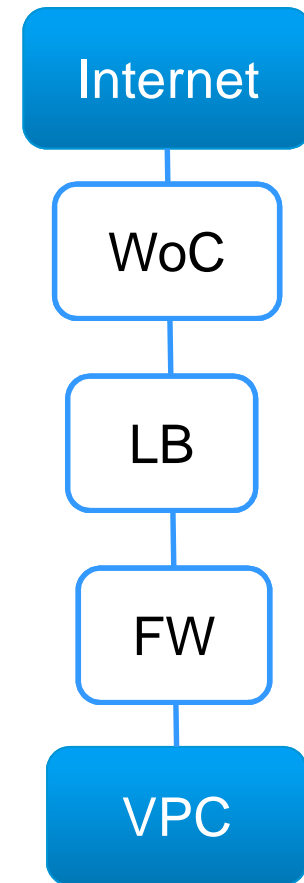


Demo

- Telefonica description
- IB-Nemo Work

Use-Case: Service Chaining

- Create Service Chaining Function path
 - Network functions in path: firewall, load balancer, WAN optimization between virtual private cloud and the internet.
- Model Definitions
 - **Flow1 match** Internet-Traffic Policy ID1
 - **Policy** ID1 **gothrough** (firewall, WoC)
- Intent states
 - **Link** sf1 **Endnodes** (VPC,Internet)
Properties flow1 inbound flow2 outbound



FAQ-5

- Q1: Why should IETF form a WG to examine a Intent-based Protocol?
- Q2: Can Intent-Based protocol control more than networks?
- Q3: Why an Intent-Based language within a few commands? How will you control all of the network management devices that control the network
- Q4: Is it Time for IETF Standardization? What will be missed if IETF does not standardize?
- Q5: How will Nemo verify its small set of operations is useful? Why will you use test cases and data models to do this?

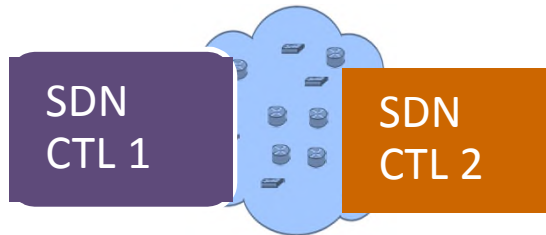
Q&A SLIDES

Operator's dreams

Nightmare

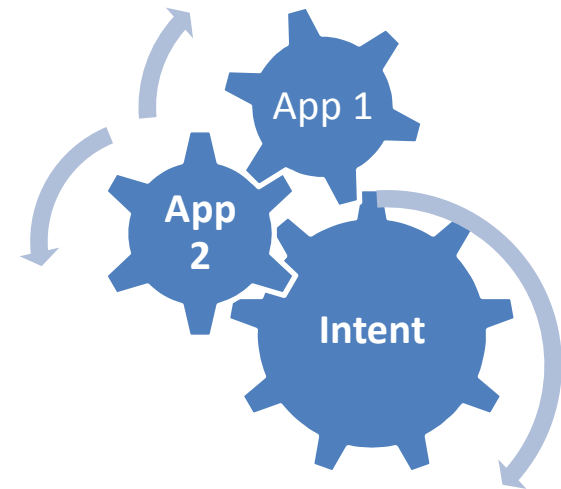
- Three wonderful services that SDN controllers provide collide
- SDN controllers fight over control of network, and both controllers fail because each assumes control

[multi-writers problem]



Delightful

- Users select what they want on a portal
- Intent engine runs and network automatically creates network based on users preloaded constraints



Intent NBI engine

