



The screenshot shows the GMOC Web Interface with the following components:

- Header:** "gMOC GENI META-OPERATIONS CENTER" logo and "GMOC Web Interface" title.
- Navigation:** "Aggregate/Cluster" buttons for "All", "PlanetLab", "ProtoGENI", "ORCA-BEN", "ORBIT", "SHC", "OpenFlow", and "GMOC_KR".
- Search:** A search bar with a "Search:" label and a list of page numbers (1-10).
- Table:** A table with columns "URN" and "Last Contacted:". The URN column contains entries like "urn:publicid:IDN+emulab.net+node+airswitch" and "urn:publicid:IDN+emulab.net+node+apcon1". The "Last Contacted:" column shows "Tue Mar 15 12:03:01 2011 (UTC)".
- Map:** A "Geographic Logic" map showing a network overlay on a geographic map of North America.
- Node Statistics:** A section titled "Node Statistics - urn:publicid:IDN+planet-lab.org+component+75-130-96-13.static.oxfr.ma.charter.com" showing metrics like "Max Tpcpu 73.14", "liveslices 6.62", and "syscpu 16.38".

GENI Meta Operations Center Tutorial

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GMOC Tutorial



- 🔱 **Create Demo Slice**
- 🔱 **What is GMOC?**
- 🔱 **GMOC Operational Dataset**
- 🔱 **Emergency Stop**
- 🔱 **GMOC portal demo using Demo Slice**



First: Some Demo Prep

- 🔸 **Demo later in the session: GMOC portal**
- 🔸 **Create Planetlab slice: “iub_gmoc_demo”**
- 🔸 **Data should appear in GMOC in ~5 minutes. We’ll check back later!**

What is GMOC?



❏ **Explore operations needs of GENI, facilitate data sharing, perform early prototype operations functions**

❏ **Early functions:**

❏ Operational data-sharing

❏ Emergency Shutdown

❏ Prototype/pilot infrastructure provider operations support

Operational Datasharing

🔸 **Allows GENI projects to share data about their operational state with GMOC and with each other**

🔸 **Data includes:**

🔸 Topology

🔸 Operational Status

🔸 Administrative Status

🔸 Utilization Measurement

🔸 Specialized Data



Datasharing: Topology

- ❏ **Captures data about network links, components, slices, and slivers -- and their interconnections/associations with each other**
 - ❏ extant components and their relationships to aggregates
 - ❏ extant slivers and their relationships to slices/components
 - ❏ connections between components
 - ❏ characteristics of connections (e.g. link speed, technology type, etc.)

Datasharing: Admin Status

- ✦ Captures the *configured* state of a piece of infrastructure
- ✦ “port A on device B is configured to be up”
- ✦ “circuit connecting X to Y is configured to be down”
- ✦ “compute node Z is configured to be up”


Datasharing: Oper Status

- ✦ Captures the *operational* state of a piece of infrastructure
- ✦ “port A on device B had been detected to be up”
- ✦ “circuit connecting X to Y has been detected to be down”
- ✦ “compute node Z had been detected to be up”




Datasharing: Measurement

Captures data about how a project/infrastructure is being used

 network link utilization (e.g. bits/packet/errors over time)

 CPU/disk/etc. utilization

 utilization of other resources (e.g. RF spectrum)

 can be provided on a per-component, per-slice, or per-sliver basis

Datasharing: Specialized

- ❏ **GENI is intended to be a place that can give rise to novel design/ architecture**
- ❏ **GMOC recognizes the need to support operational data sharing for “less common” sets of data**
- ❏ **“Specialized” operational data collection is designed to capture operational attributes which may apply only to a small subset of GENI projects**

Datasharing: Data Exchange

- ❏ **GMOC has provided a API that can be used to share this data with GMOC**
- ❏ **GMOC is also happy to take this data in a native/convenient format and translate it into the GMOC format.**
- ❏ **Operational dataset document[1] describes the data we request from each project and marks each bit of data as “required” or “optional”**
- ❏ **[1] http://groups.geni.net/geni/attachment/wiki/GENIMetaOps/operational_dataset_v31.pdf**

Data Sharing: Current Status

GMOC collatoration status

https://gmoc-db.grnoc.iu.edu/secure/gmoc_wos.cgi

gMOC
GENI META-OPERATIONS CENTER

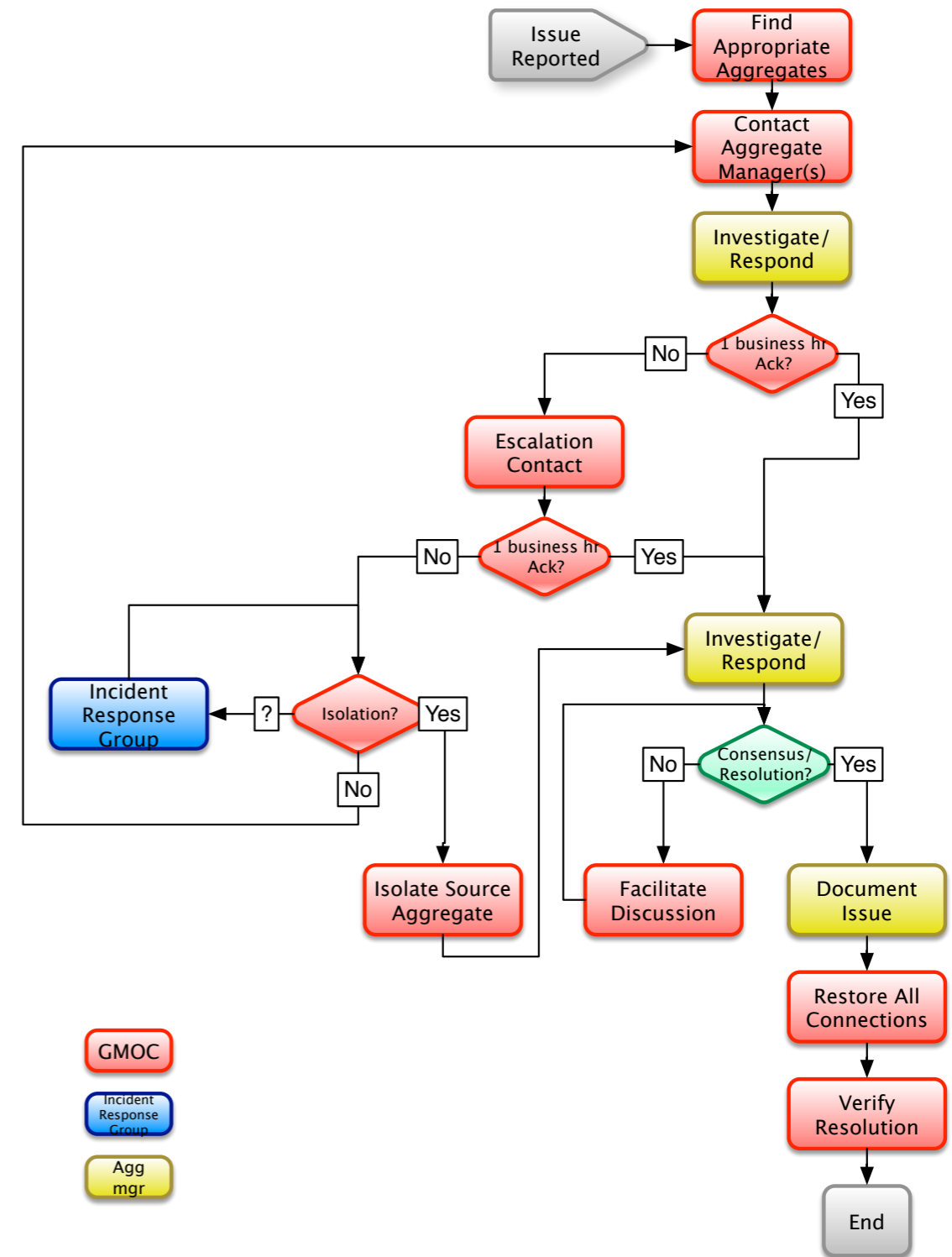
Organization	Emergency Contact	Escalation Contact	Topology Information	Node Information	Slice Information	Network Measurement	Node Measurement	Slice Measurement
I2	y	y	100%	100%	5%	100%	100%	0%
ProtoGENI	y	n	80%	15%	0%	15%	5%	0%
NLR	y	y	100%	100%	5%	100%	100%	0%
ORCA-BEN	n	n	80%	15%	0%	0%	0%	0%
OpenFlow	y	n	100%	90%	5%	95%	80%	0%
PlanetLab	n	n	80%	80%	50%	0%	90%	80%

Emergency Stop

- ❖ One of the early GMOC functions is the ability to coordinate an “Emergency Stop” for a GENI experiment / piece of infrastructure which is misbehaving in such a way that it needs to be shut down or isolated from the rest of GENI.
- ❖ GMOC operational data can be used to help investigate/isolate problem to aid in emergency stop
- ❖ GMOC now collecting Emergency Stop contact data from each GENI project. Ready to begin pilot emergency stop operations.



- Document describing emergency stop procedures discussed at previous GEC OMIS meetings
- Full description of this procedure available on the GMOC GENI wiki (below)



http://groups.geni.net/geni/attachment/wiki/GENIMetaOps/Emergency_Stop_System_Description_v5.1.doc?format=raw

Emergency Stop Contacts

- GMOC is soliciting Emergency Stop contact data from GENI projects providing infrastructure
 - Two contacts: primary and escalation. e-mail and phone contact methods.
- To submit your emergency contact data today, see Camilo Viecco after this session
- To submit your emergency contact data after GEC, please e-mail gmoc@grnoc.iu.edu
- If you don't submit anything, we'll come looking for you :)

Emergency Stop Contacts

https://gmoc-db.grnoc.iu.edu/protected/emergency_contact.cgi

https://gmoc-db.grnoc.iu.edu/protected/emergency_contact.cgi Google

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Select organization: ETRI

Organization name: Organization country: AU

Email Address:

Last Name:

Given Names:

Phone:

Primary Contact
 Escalation contact

Submit

GMOC Portal

- ❏ Provide a view into the data collected by GMOC
- ❏ “dashboard” view of GENI operational status as a whole
- ❏ Integrated with measurement systems, display operational measurement data from GENI projects which are providing it.
- ❏ GIS-centric and logical layouts available. real-time status, updated at different intervals depending on data exchange agreement with particular GENI data provider

GMOC Portal UI

The screenshot displays the GMOC Web Interface in a browser window. The page title is "GMOC Web Interface" and the URL is "http://gmoc-db.grnoc.iu.edu/". The interface includes a search bar, a "Nodes" tab, and a table of node information. A "Geographic Logic" map shows a globe with network connections overlaid.

GMOC Web Interface

Aggregate/Cluster: PlanetLab ProtoGENI ORCA-BEN ORBIT SHC OpenFlow GMOC_KR

Nodes Slices

Search:

<< first < prev 1 2 3 4 5 6 7 8 9 10 next > last >>

URN	Last Contacted:
urn:publicid:IDN+emulab.net+node+airswitch	Wed Mar 16 11:16:25 2011 (UTC)
urn:publicid:IDN+emulab.net+node+apcon1	Wed Mar 16 11:16:25 2011 (UTC)
urn:publicid:IDN+emulab.net+node+bbg1	Wed Mar 16 11:16:25 2011 (UTC)
urn:publicid:IDN+emulab.net+node+bbg2	Wed Mar 16 11:16:25 2011 (UTC)
urn:publicid:IDN+emulab.net+node+cisco1	Wed Mar 16 11:16:25 2011 (UTC)
urn:publicid:IDN+emulab.net+node+cisco10	Wed Mar 16 11:16:25 2011 (UTC)
urn:publicid:IDN+emulab.net+node+cisco12	Wed Mar 16 11:16:25 2011 (UTC)
urn:publicid:IDN+emulab.net+node+cisco15	Wed Mar 16 11:16:25 2011 (UTC)

<< first < prev 1 2 3 4 5 6 7 8 9 10 next > last >>

Geographic Logic

© 2011 Europa Technologies
 US Dept of State Geographer
 Data SIO, NOAA, U.S. Navy, NGA, GEBGO
 © 2011 Google



GMOC Measurement UI

SNAPP - Home

http://gmoc-db.grnoc.iu.edu/measurement/#&p=1145&ccid=1526&tab=1&search=openflow%20-port&url=all-graphs.cgi%3Fcategory_id%3D1145%26collection_class_id%3D...

GlobalNOC Global Research Network Operations Center

SNAPP SNMP Network Analysis and Presentation Package

Navigation

Search Browse Advanced

Browse By: Node

Type of Data: Openflow switch(30s)

Aggregate Graph All Graphs Side by Side

Name	Description
urn:publicid:IDN+openflow.org+stats+ah04-hp6f	urn:publicid:IDN+openflow.org+stats+ah04-hp6f
urn:publicid:IDN+openflow.org+stats+atla.of.nlr.i	urn:publicid:IDN+openflow.org+stats+atla.of.nlr.i
urn:publicid:IDN+openflow.org+stats+chic.of.nlr	urn:publicid:IDN+openflow.org+stats+chic.of.nlr
urn:publicid:IDN+openflow.org+stats+denv.of.nlr	urn:publicid:IDN+openflow.org+stats+denv.of.nlr
urn:publicid:IDN+openflow.org+stats+gibson-hp	urn:publicid:IDN+openflow.org+stats+gibson-hp
urn:publicid:IDN+openflow.org+stats+mac:00:24	urn:publicid:IDN+openflow.org+stats+mac:00:24
urn:publicid:IDN+openflow.org+stats+mac:0e:8c	urn:publicid:IDN+openflow.org+stats+mac:0e:8c
urn:publicid:IDN+openflow.org+stats+mac:0e:8c	urn:publicid:IDN+openflow.org+stats+mac:0e:8c
urn:publicid:IDN+openflow.org+stats+mac:0e:8c	urn:publicid:IDN+openflow.org+stats+mac:0e:8c
urn:publicid:IDN+openflow.org+stats+mac:0e:8c	urn:publicid:IDN+openflow.org+stats+mac:0e:8c
urn:publicid:IDN+openflow.org+stats+mac:0e:84	urn:publicid:IDN+openflow.org+stats+mac:0e:84
urn:publicid:IDN+openflow.org+stats+mac:0e:84	urn:publicid:IDN+openflow.org+stats+mac:0e:84
urn:publicid:IDN+openflow.org+stats+mac:0e:84	urn:publicid:IDN+openflow.org+stats+mac:0e:84
urn:publicid:IDN+openflow.org+stats+mac:0e:84	urn:publicid:IDN+openflow.org+stats+mac:0e:84

19 total results

<< first < prev 1 2 next > last >>

(using 2 minute averages)

Aggregate of Openflow switch(30s) in Node
Tue Mar 15 2011 07:33 to Wed 16 Mar 2011 07:33:21 EDT

25 G

0 5 G 10 G 15 G 20 G 25 G 30 G 35 G 40 G 45 G

8:00 12:00 16:00 20:00 0:00 4:00

12:00 20:00 4:00

auto-tree-byte_count	auto-tree-flow_count	auto-tree-packet_count
Average: 4.16 G	Average: 5.7 G	Average: 5.64 G
Maximum: 29.87 G	Maximum: 44.36 G	Maximum: 44.48 G
Last: 0	Last: 0	Last: 0
Crosshair: 0	Crosshair: 0	Crosshair: 0

Reset Zoom Out Parameters

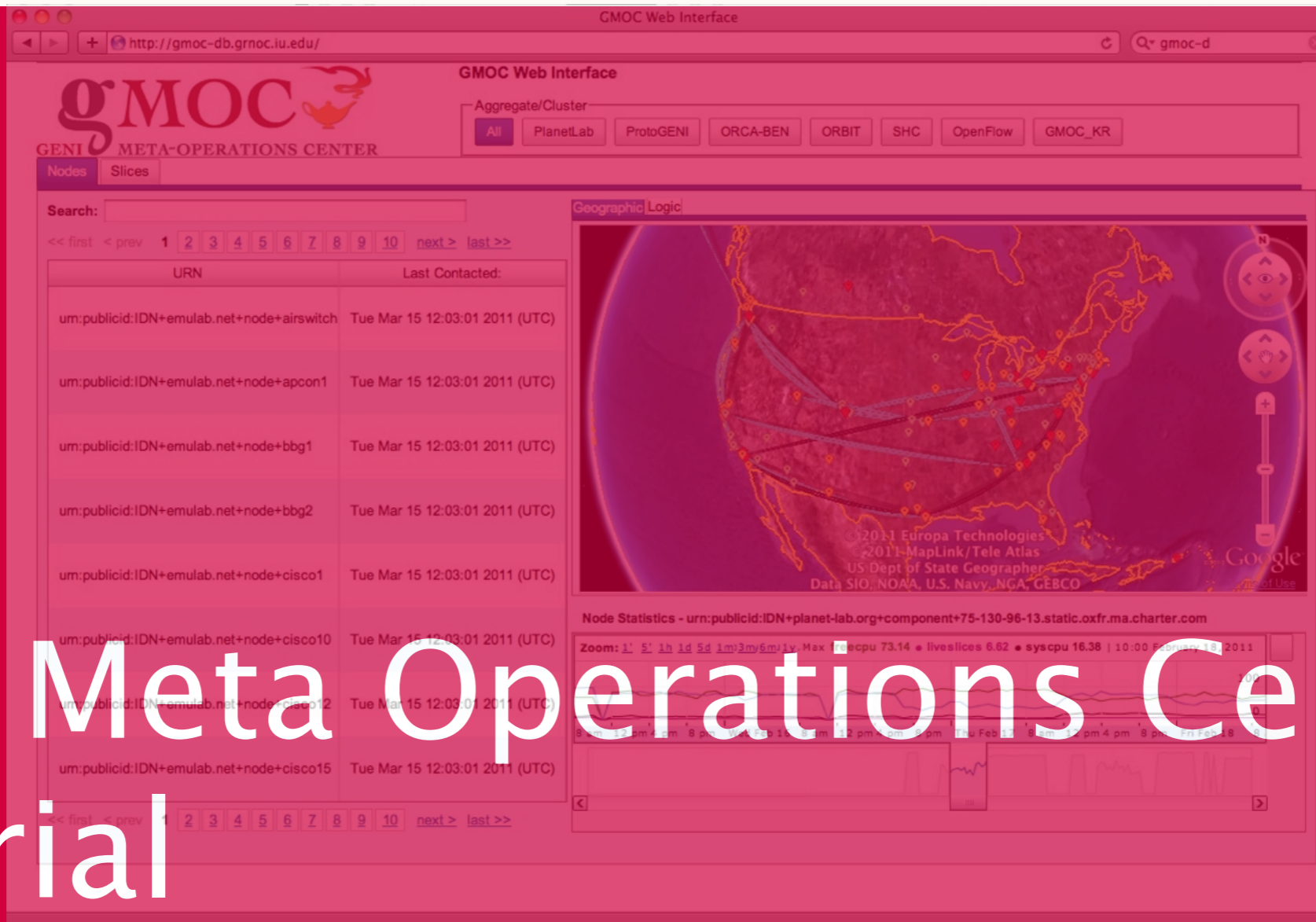
GMOC This Year

- ❏ **Integrating additional data from projects we are already collecting data from**
- ❏ **Collect data from additional projects (working with INSTOOLS now. One focus area will be I&M projects)**
- ❏ **Begin supporting initial “production” emergency stop function**
- ❏ **Begin pilot/prototype operations support for a GENI project**

GMOC links

- 🛡️ **Portal UI:** <http://gmoc-db.grnoc.iu.edu/>
- 🛡️ **Measurement UI:** <http://gmoc-db.grnoc.iu.edu/measurement/>
- 🛡️ **Datasharing Status Table:** https://gmoc-db.grnoc.iu.edu/secure/gmoc_wos.cgi
- 🛡️ **Prototype monitoring:** <http://gmoc-db.grnoc.iu.edu/nagios/>
- 🛡️ **GMOC Wiki:** <http://groups.geni.net/geni/wiki/GENIMetaOps>

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