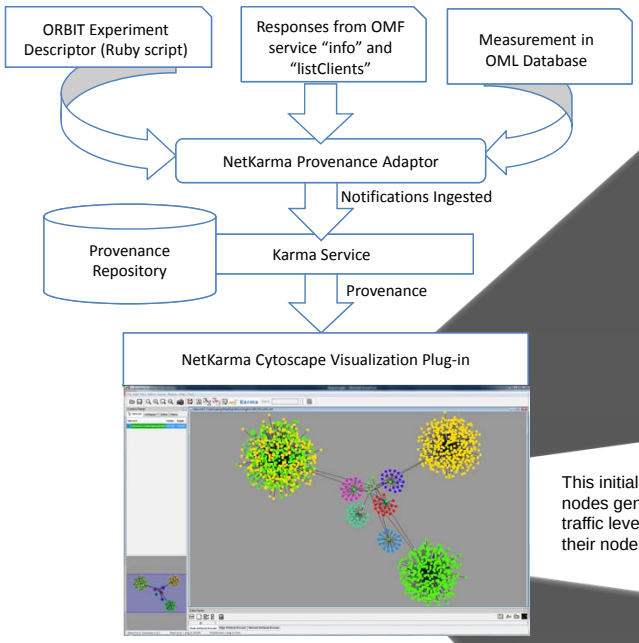
NetKarma Reveals the Provenance of WiMAX Experiments on ORBIT

DATA TO INSIGHT CENTER
INDIANA UNIVERSITY
Pervasive Technology Institute

InCNTRE

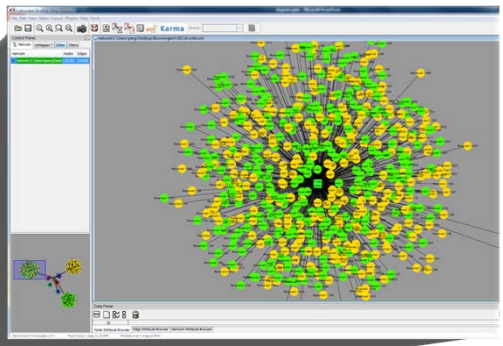
Provenance of WiMAX on ORBIT

- NetKarma Adaptor harvests provenance from the experiment description, OMF query service, and measurement data in the OML database. When the ORBIT Traffic Generator (OGT) is used, no further instrumentation is required to capture provenance from ORBIT.
- NetKarma uses the underlying Karma Service to generate a provenance graph.
- The NetKarma Visualization Plug-ins that can be integrated into Cytoscape [1] are used to retrieve and visualize experiment provenance from the Karma repository.



Provenance of "Many-to-One Communication"

- Provenance capture and visualization through NetKarma allows GENI experimenters to capture and analyze detailed provenance of the events in their experiment. The visualizations expose and correlate key performance measurements with the parameter configurations used to run the experiments.
- NetKarma's visualization extensions for Cytoscape enable interactive performance analysis with respect to parameter configurations. The visualizations below show the analysis of packet throughput.

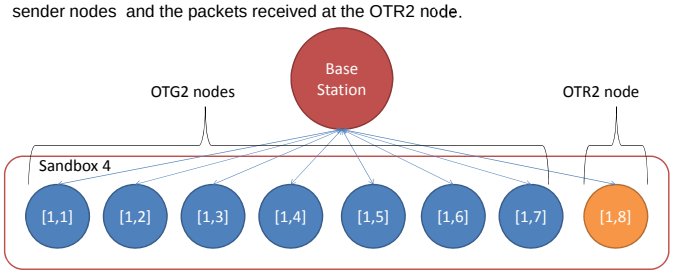


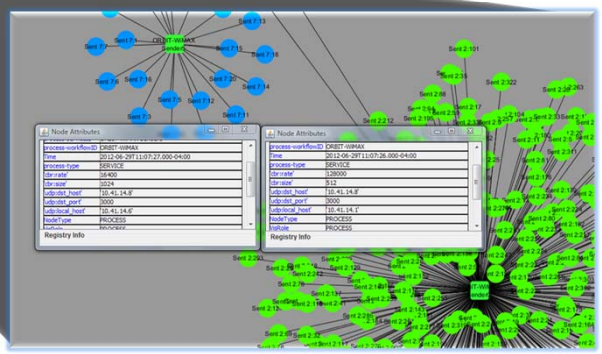
This graph shows the packet traffic at the receiver node. The NetKarma plug-in colors the packets according to their source IP address, showing that traffic from only two of the nodes (yellow and green) was successfully received.

This initial view shows that the WiMAX nodes generated significantly different traffic levels as depicted by the size of their node clusters.

The Experiment: Many-to-One Communication

- The above visualizations show the provenance captured for the "Many-to-One Communication" experiment in the OTG tutorial [2].
- The experiment is based on the current OTG2 version and we vary the configuration of the packet size (cbr:size) and data rate (cbr:rate) for each of the sender nodes.
- NetKarma color-codes the packets generated by each of the 7 OTG2 sender nodes and the packets received at the OTR2 node.





By zooming in and comparing the metadata harvested about each sender, we can see that it's the difference in configuration of OTG2 that is resulting in different throughput results.

References

[1] http://www.cytoscape.org/

[2] http://www.orbit-lab.org/wiki/Documentation/OTG/UserManual