Do Computer Networks Have a Pulse?

Detecting periodicity and change in autonomic netflow

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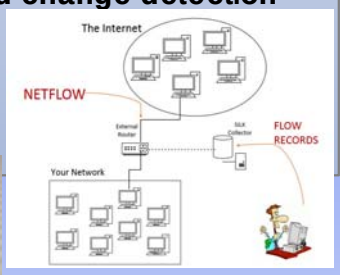
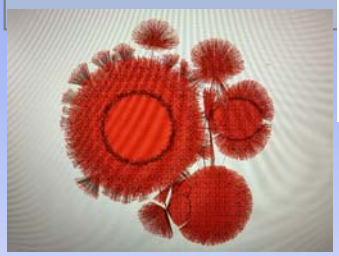
Cyber Situational Awareness

- The ability to understand the cyber-state of your system – is it under attack? Is it operating normally? If not what is wrong where?

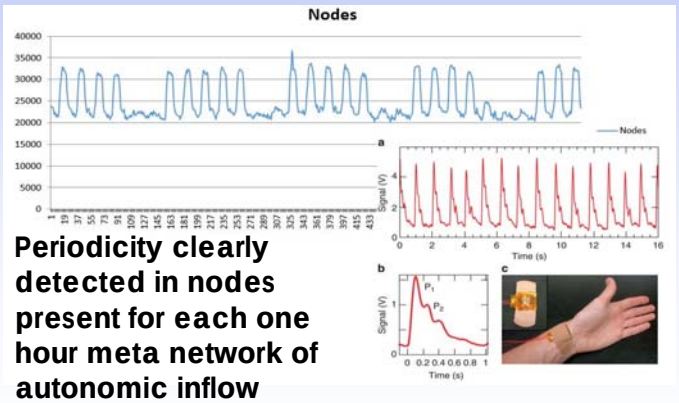
GOAL – Enable improved cyber situational awareness

- Currently it is difficult for IT manager to assess
  - Many tools provide some guidance on what is happening in cyber-space
  - No tool provides perfect awareness
- Approach: Utilize a network science vision of the network flow
- One month of Netflow data was collected from a live boundary router on an operational network. Data was partitioned into four categories: human driven inflow, human driven outflow, autonomic inflow, and autonomic outflow. Then, the data was analyzed with ORA's built in dynamic network analysis and change detection tools.





One hour of Netflow visualized in ORA



Periodicity clearly detected in nodes present for each one hour meta network of autonomic inflow

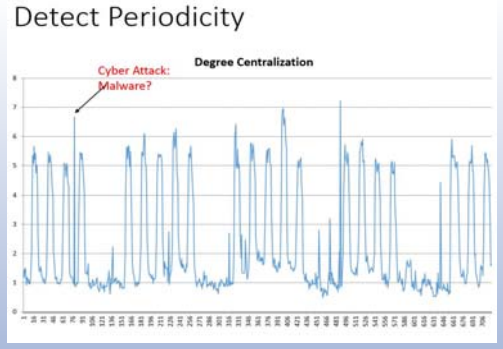
Collect Autonomic Inflow

Bytes = 1 – 96, no flags, packets < 3

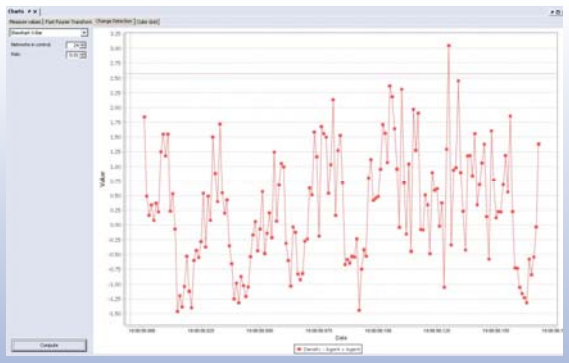
```
gdobson@silk:~
for i in {0,1}{0,1,2,3,4,5,6,7,8,9} 20 21 22 23; do
rwfilter --start=$1*.$i --type=in,inweb --bytes=1-96 --packets=1-2 --pass=stdout |
rwcut --fields=1-2 -delimited=',' >ai$i.csv
done
```

Create Dynamic Meta Networks

Results



Results



This project provided a proof of concept that network level measures can provide improved cyber situational awareness. Standard volume based netflow analysis lacks level of detail that network science can provide. Future work will include attributing network change detection results to operational network anomalies.

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