NVisionIP: An Animated State Analysis Tool for Visualizing NetFlows

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Outline

- Motivation
- Situational Awareness & Visualization
- Visualization Criteria
- NVisionIP – Demo
- Conclusion

Motivation

- Motivated by the concerns of Security Engineers at NCSA
- How do you provide situational awareness of the network – awareness of the state of the devices on the network
- Focus on situational awareness then intrusion detection
- Wanted a tool where the user can **see** the state information of the devices on the network

Situational Awareness Using Visualization

- Use visualization to show information about the network
- Visualization is used because it is:
  - Easy to detect patterns in the traffic
  - Conveys a large amount of information concisely
  - Can be quickly created by machines
- Use the security engineers background knowledge and analysis capabilities along with the capability of machines to quickly process and display data.

Key Features of Network Visualizations for Security

- **Interactivity:** User must be able to interact with the visualization
- **Drill-Down capability:** User must be able to gain more information if needed
- **Conciseness:** Must show the state of the entire network in a concise manner

Interactivity

- Allow security engineer to decide what to see
  - Data views (Cumulative, Animation (interval lapse) and Difference)
  - Features to view (traffic in/out, number of ports used, etc)
  - Filtering

Drill-down capability

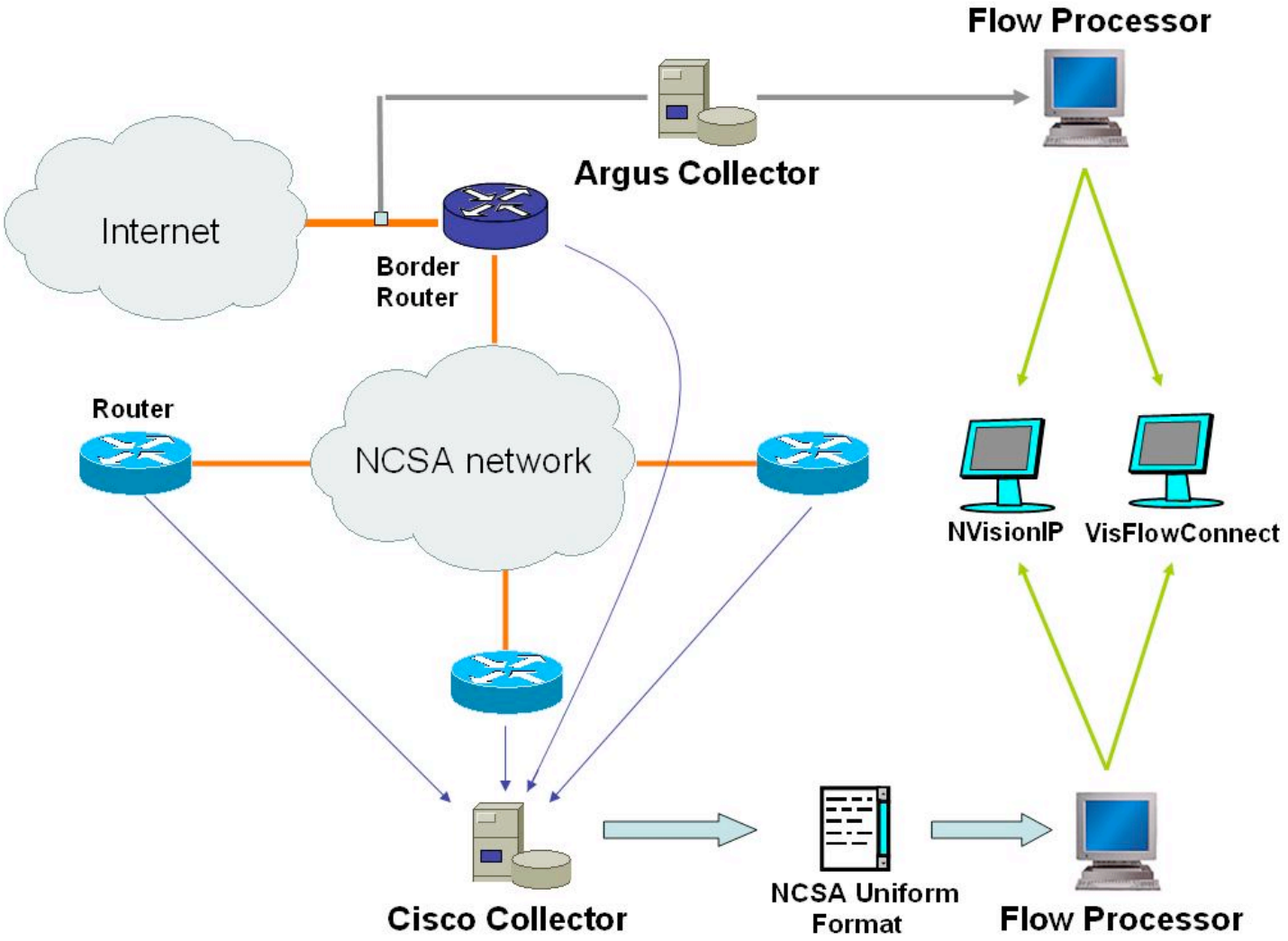
- Allow security engineer to see the network at different levels of resolutions
- Entire network – Galaxy View
- A subset of hosts – Small Multiple View
- A single machine (IP) – Machine View

Conciseness

- Allow a security engineer to view a large amount of information concisely
  - Show entire network with minimum of scrolling

  …..thus allow security engineer to gain **situational awareness** of the network

Where is the data coming from at NCSA?



DEMO

For a single IP

- **FlowCount** - Number of times IP address was part of flow (Flow Count)
- **SrcFlowCount, DstFlowCount** – Number of time IP address was source and destination of a flow
- **PortCount** – Number of unique ports used
- **SrcPortCount, DstPortCount** – Number of unique ports used as source and destination ports
- **ProtocolCount** – Number of unique protocols used
- **ByteCount** – Number of bytes transferred.

Getting NVisionIP

- Distribution Website:

http://security.ncsa.uiuc.edu/distribution/NVisionIPDownLoad.html

- SIFT Group Website:

http://www.ncassr.org/projects/sift/

Conclusion

- Combine Security Engineers' skills with the visualization capabilities of machines.
- Visualizations with three key properties to provide Situational Awareness:
  - Interactivity
  - Drill-Down Capability
  - Conciseness

Questions