A flexible DDoS detection System using IPFIX

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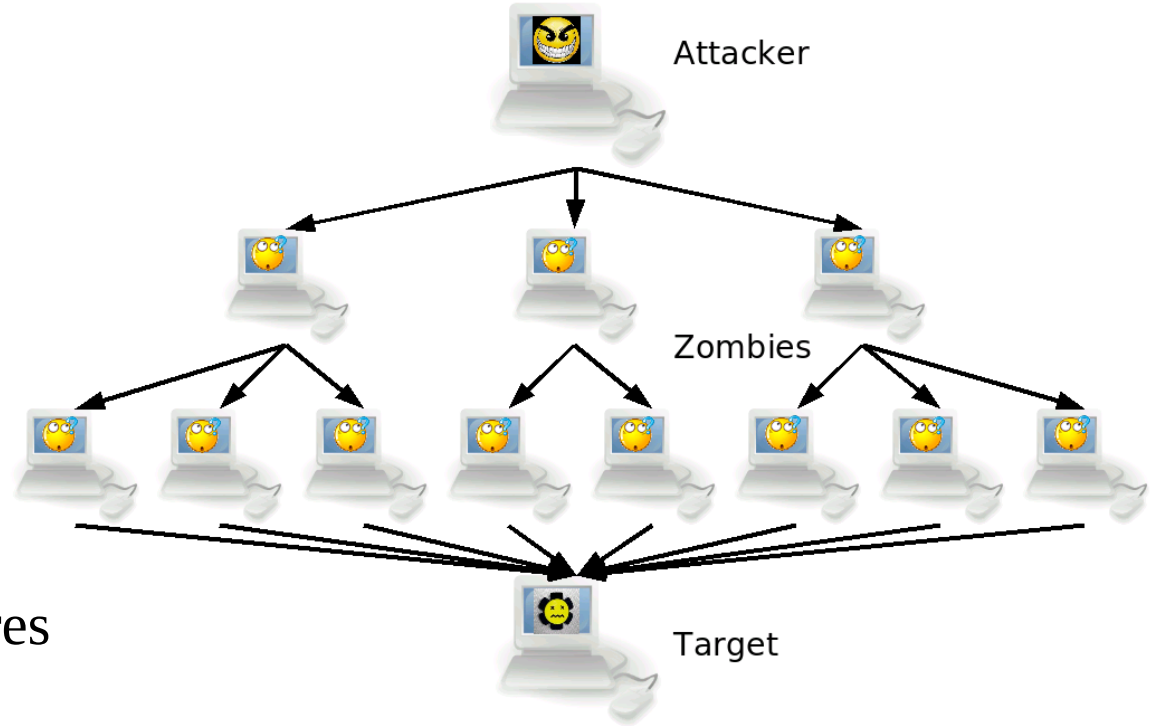
Outline

- Introduction:
  - Denial of Service – The Internet Bottleneck problem
- The Architecture
  - System Architecture
  - OpenIMP platform
  - DDos Detection Metrics
  - Detection using Latent Semantic Indexing and Clustering
- Conclusion:
  - How does IPFIX support the integration of new metrics

The DDoS Problem

- DDoS Flooding attacks saturate the final link(s)
- Filters are only effective before the bandwidth becomes scarce
- Hence, the end user can hardly take effective measures



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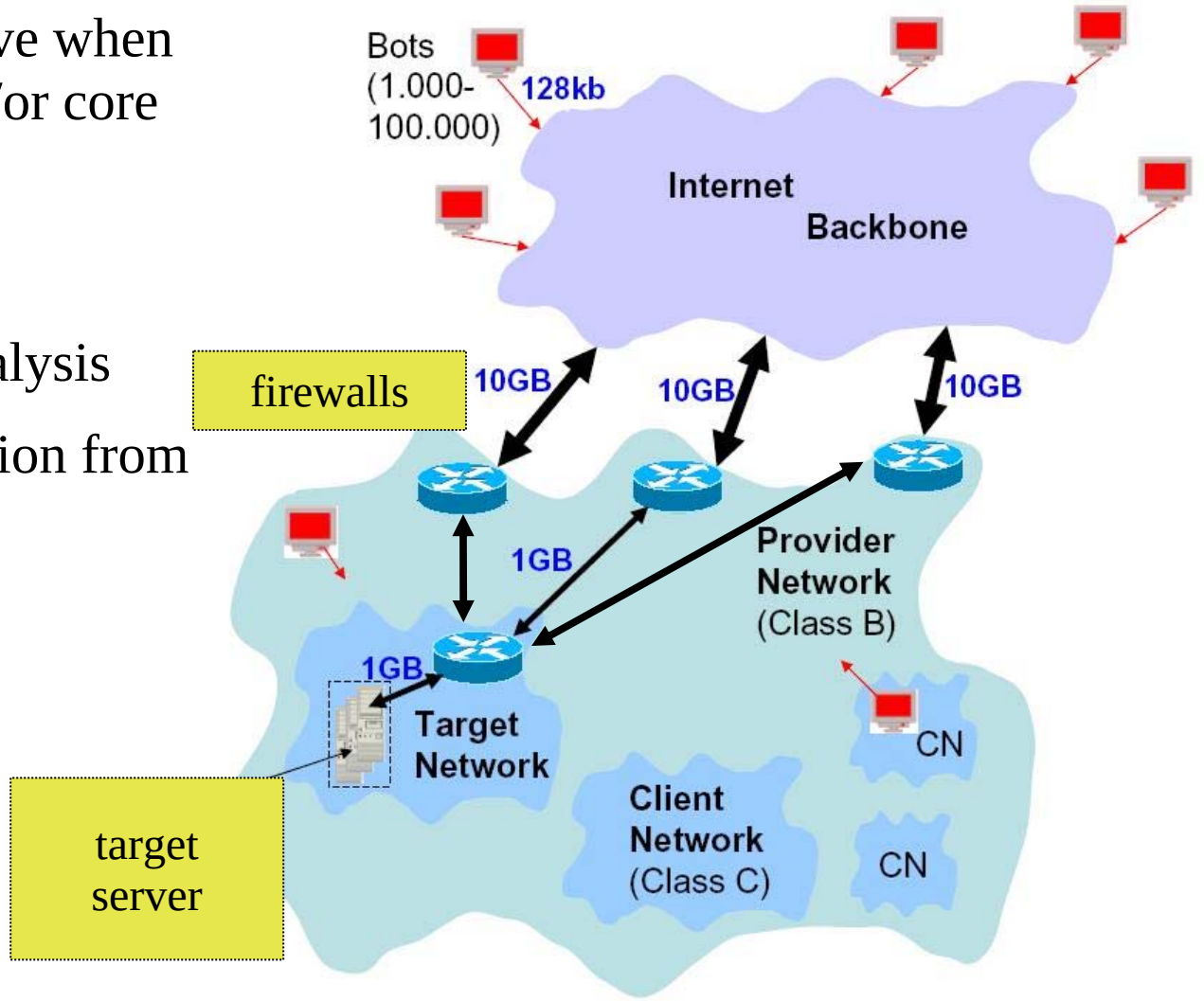
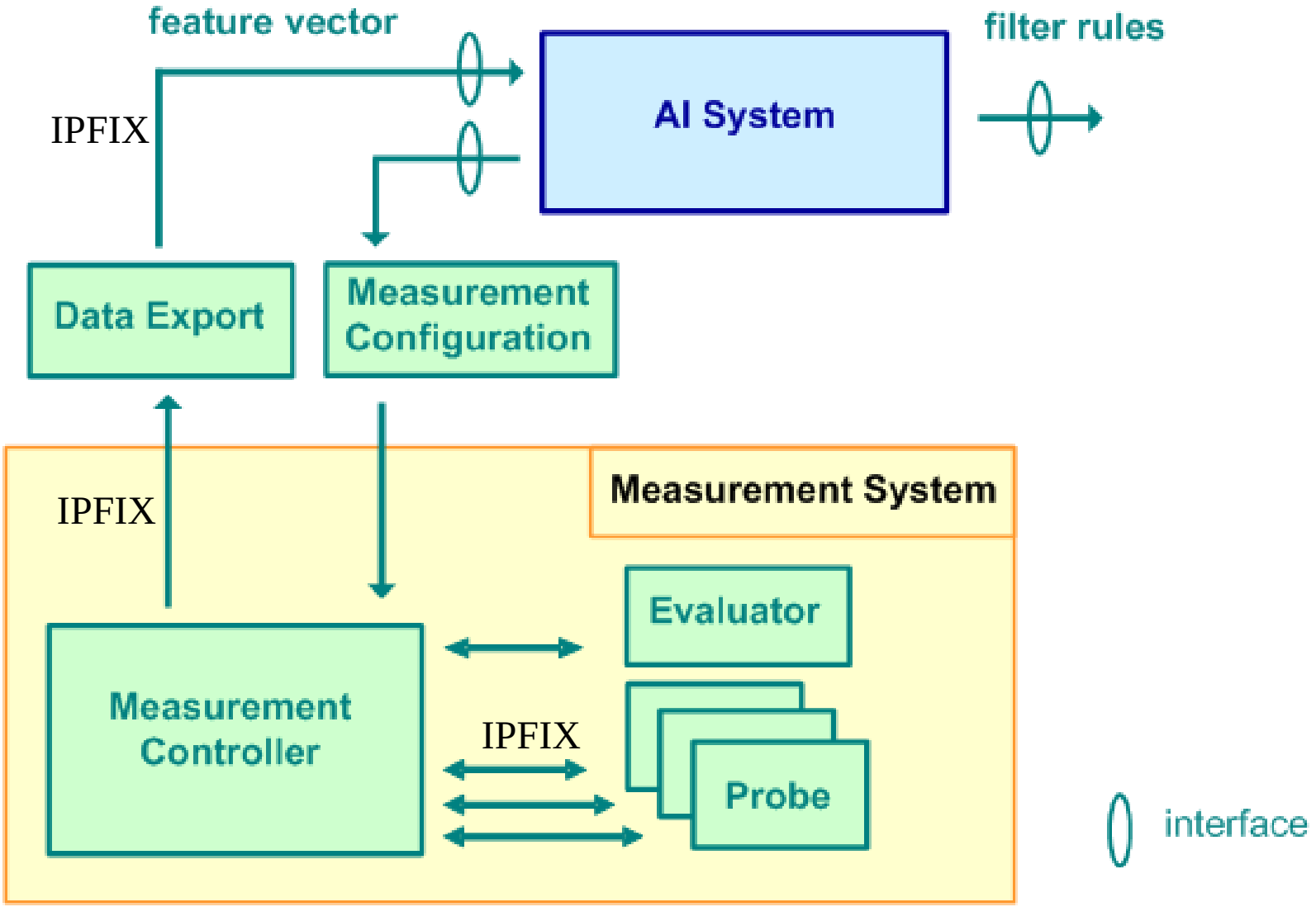
Mitigating DDoS at ISP level

- Mitigation can be effective when implemented on ISP and/or core routers
- This requires
  - high-speed traffic analysis
  - Information aggregation from various sources



System Overview



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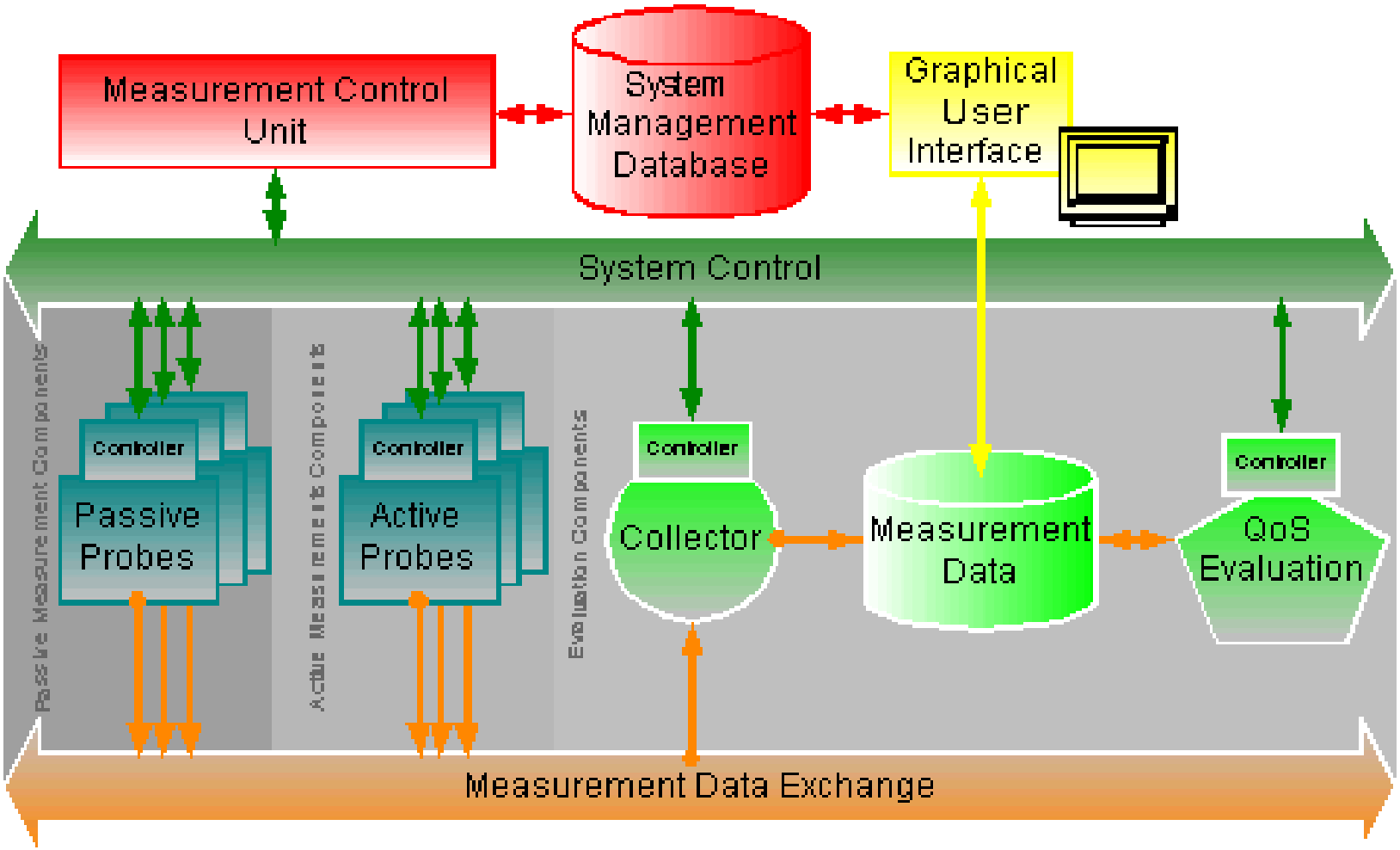
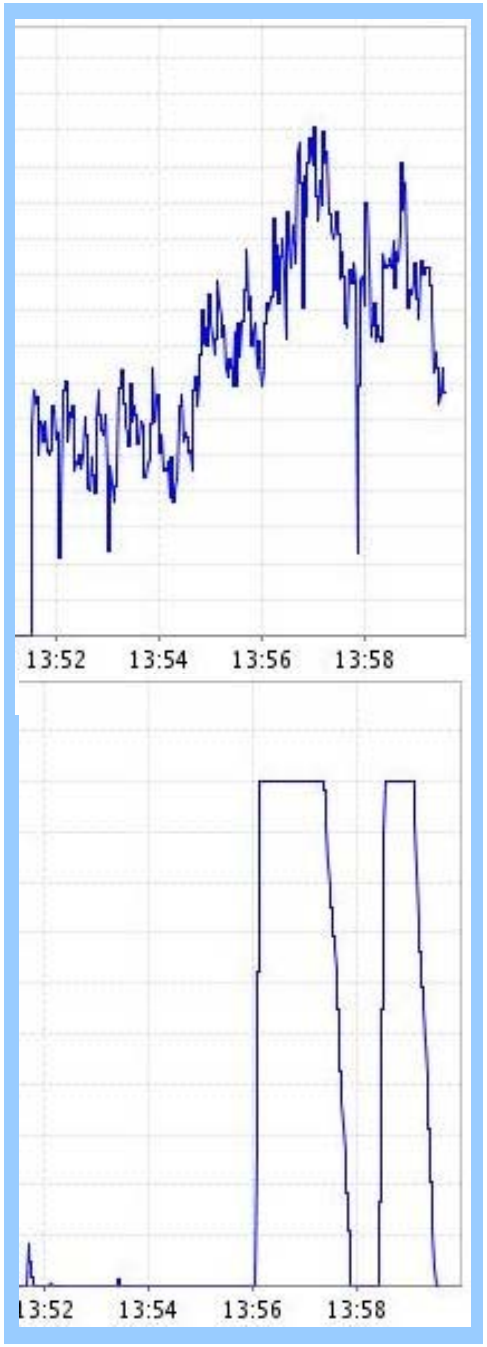
OpenIMP



DDoS Detection Metrics

- Some examples
  - Packet Count (above)
  - Byte Count
  - Packet count per flow / flag / message type
- Transformations
  - CUSUM (below)
  - Wavelet
  - Entropy



- A multitude of proposals in different papers!
- Which ones to implement?

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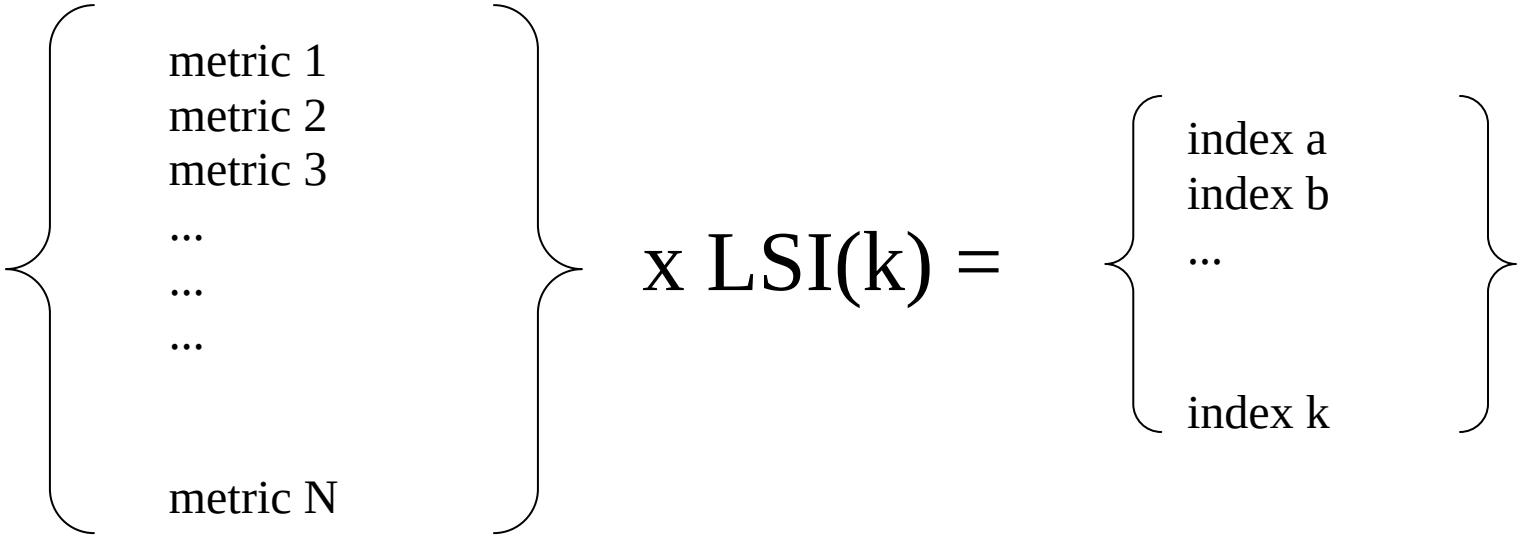
Latent Semantic Indexing

- allows to reduce a multi-dimensional feature vector
- into a lower-dimensional feature vector (easier to process)
- information preserving (principle components)
- maps all metrics into one uniformly sized *feature vector*



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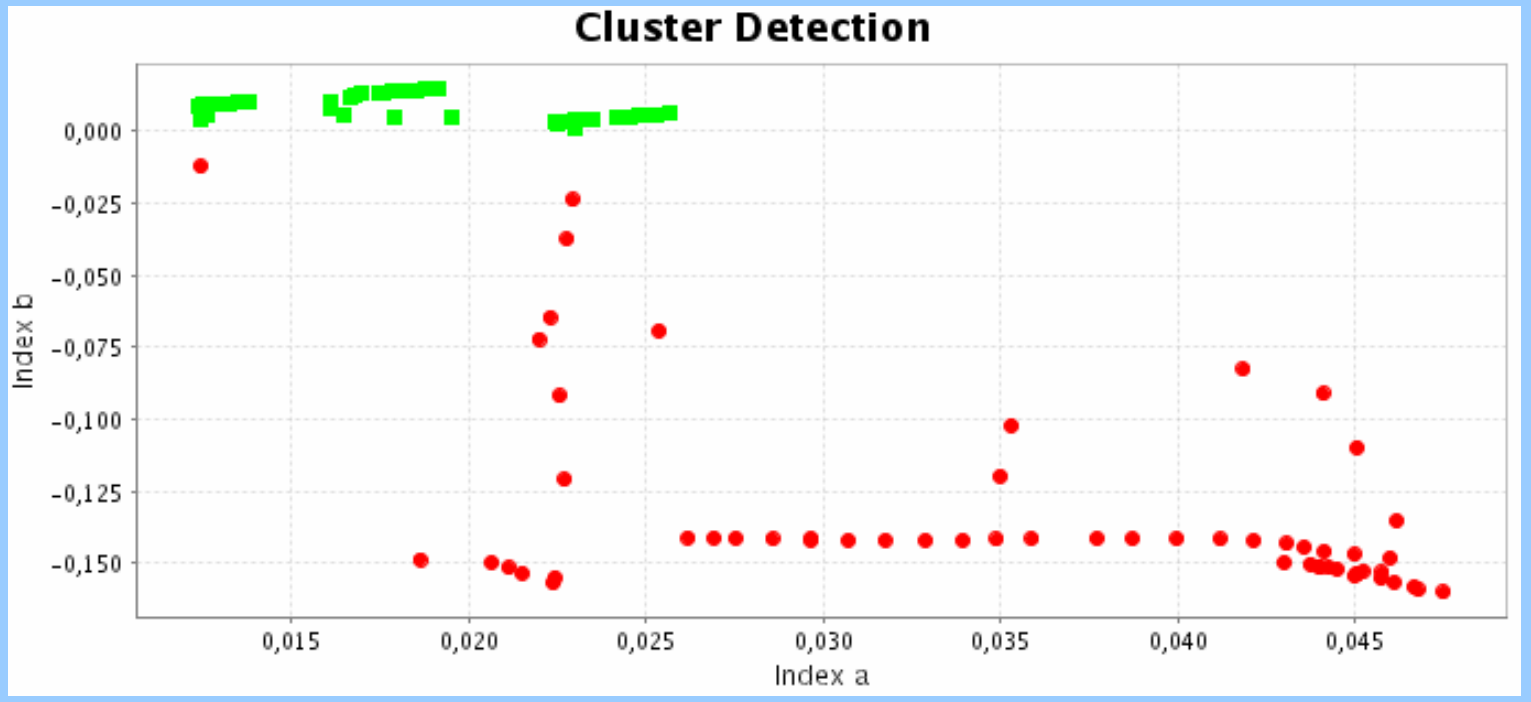
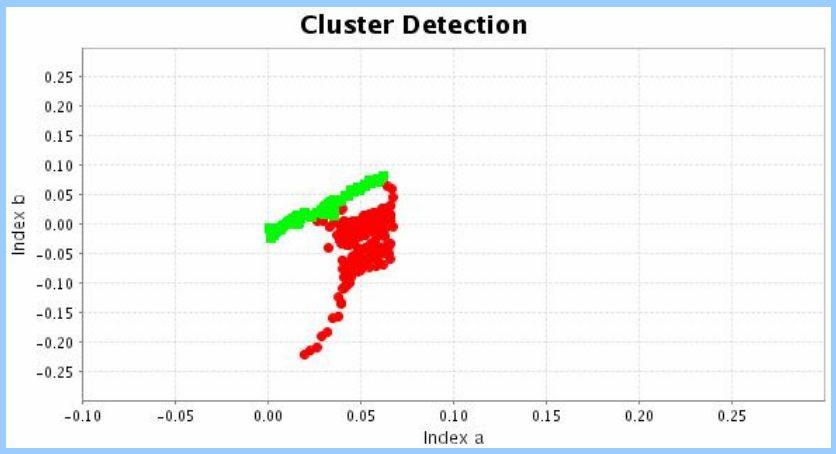
Cluster Detection





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Cluster Detection

- Unknown Clusters are a possible threat
- Reactions include
  - Filtering, if bandwidth is scarce anyway
  - Detailed analysis of identified anomalies

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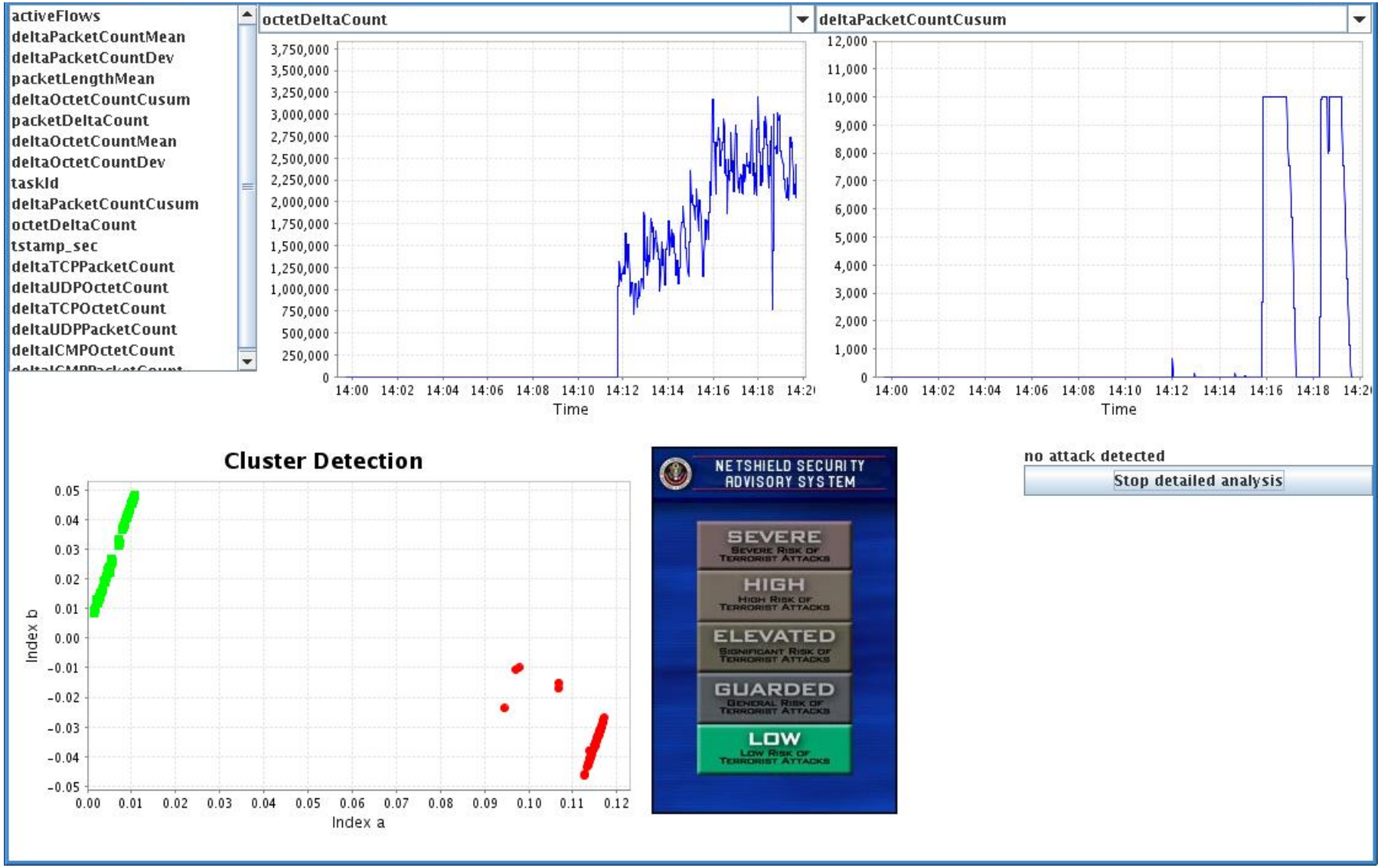
What it looks like...



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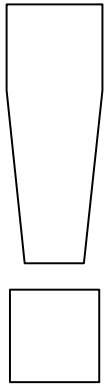
The advantage of using IPFIX

- Established standard for network metrics
- New probes/metrics can be added into the system
  - They immediately speak the language of the system
  - Standard components (routers) may provide the data
  - A training phase is needed for new information sources
- Latent Semantic Indexing reduces any number of metrics
- Cluster Detection operates on the same feature space size

- Detection seamlessly integrates new IPFIX information sources

Thank You!



Questions?