TTP: Medium Securing the Wireless Philadelphia Network

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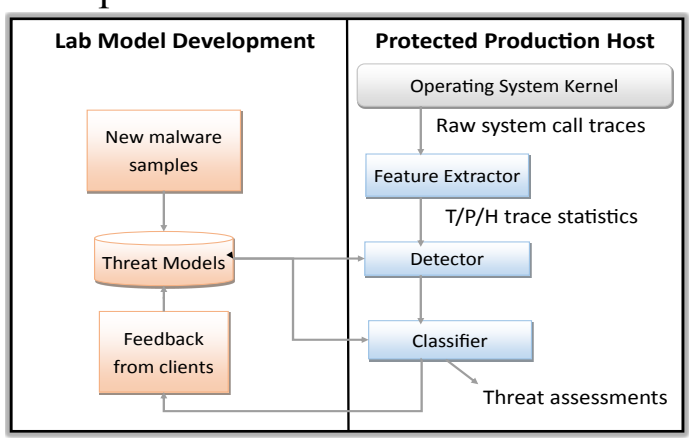
Malware monitoring and classification in Keyspots Community Computing Centers

- **Features:**
  - ◇ System call traces of malware and benign processes
  - ◇ Host-based anomaly detection
  - ◇ Mimic the production environment on live hosts



- **Deployment and evaluation:**
  - ◇ **Real-world scenario**: anomaly detectors were deployed on various KEYSPOT locations of the Philadelphia Keyspots Community Computing centers
  - ◇ Test against **125,000** malware processes, **76,000** distinct malware samples
  - ◇ Dataset time frame: more than **100 days**

Anomaly detection in DNS data from a major Internet Service Provider (ISP)

- **Motivations:**
  - ◇ Detecting volume anomalies in a large DNS dataset (4.6×10^7 DNS queries over 23 minutes) using distributed PCA based anomaly detection algorithms
  - ◇ Evaluated the tradeoff between comm. cost and solution quality of the distributed algorithms
- **Distributed PCA algorithm:**
  - ◇ Data is compressed locally, there is no need to send the whole local measurements
- **Results:**
  - ◇ Distributed PCA methods have little quality degradation, yet achieve significant savings in comm. bandwidth

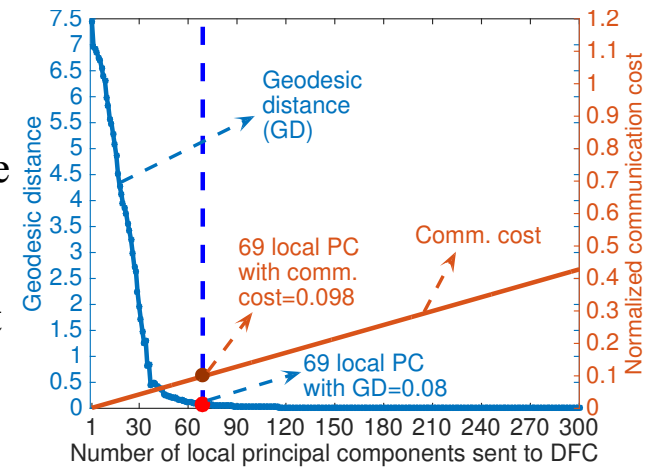


Fig 1. Horizontal partitioning with s=2

Adaptive Sampling and Statistical Inference for Anomaly Detection

Key contributions:

◇ A new efficient strategy for online performance monitoring of data centers using adaptive-rate compressive sampling

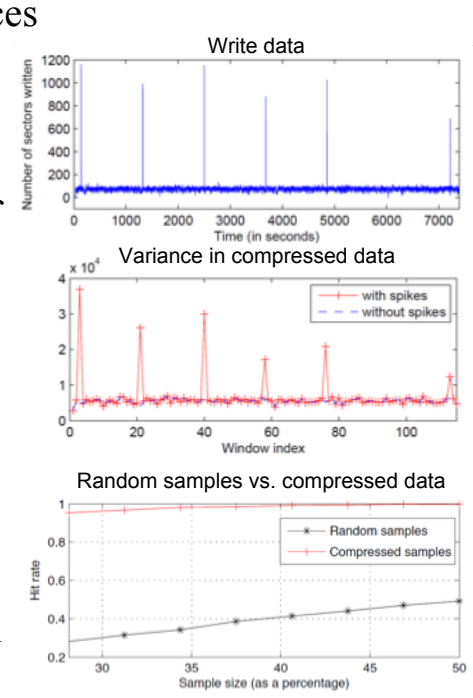
◇ A new method for anomaly detection in computer systems with compressed measurements

◇ A new, fast and distributed method of detecting anomalies in network traffic feature matrices

Results:

◇ Reconstructed data from adaptive-rate compressive sampling allows detection of abrupt changes and trends achieving 90% hit rate when the sample size is just 25%

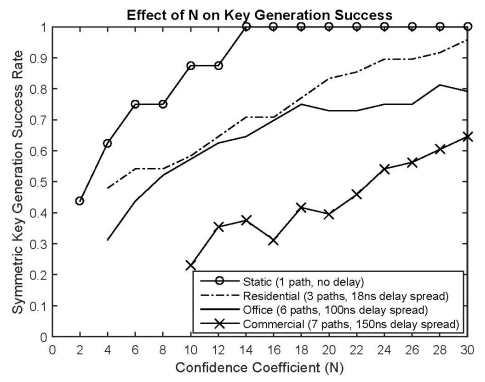
◇ Hit rate achieved using the variance of the compressed samples: greater than 95% when the sample size is greater than 28% , substantially better than with random samples



Establishing shared secret keys over wireless channels

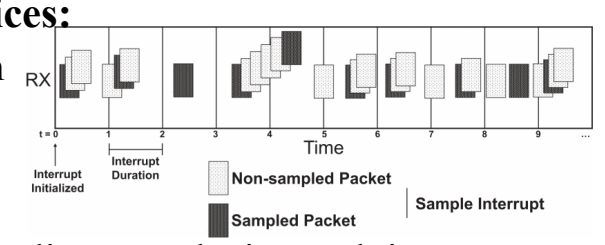
Generating symmetric keys without "hints":

- Previous PHY layer secret key generation algorithms relied on indices, salts etc. to be shared with TX node.
- Using a wireless channel emulator, we experimentally evaluated our new algorithm leveraging channel trends.
- The algorithm establishes symmetric keys without exchanging any initialization vectors, nonce, salts etc.



Road to COTS devices:

- An implementation on COTS devices
  - ◊ Intel 5300 chip
  - ◊ iwlwifi driver



- Interrupt-based sampling uses the internal timer to capture packets and minimizes hardware customization.
- A firmware update is necessary to introduce the new protocol to the chipset's driver.

References

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