M2M Sensor Security and Trust Zone

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Sprint
Overview

- M2M Overview
- M2M Sensor Network Security
- M2M Verticals and Security Issues
- Message and Alert Delivery
- Guaranteed Message Delivery
  - Location assisted
  - Network monitoring
- Concept of TrustZone
  - Software hardware and system architecture
  - Usage of TrustZone in M2M sensor network
M2M Sensor Network Security Overview
Explosive Growth Expected for M2M

Caution: Explosive Growth Potential!
M2M Magazine, 04/2010

There will be 2.1 billion M2M connected devices by 2020.
Analysys Mason, 12/2010

Yes, we suggest you sleep with one eye open, because the machines are taking over. Resistance is futile.
Engadget, 10/2010

80 million M2M devices are expected to be connected in North America by 2015.
ABI Research, 10/2010

Global M2M module market forecast to reach $3.8 billion in 2015.
ABI Research, 08/2010
M2M Verticals and Security Threads

Healthcare:

Medical sensors

Patient credentials: Connected Ambulance
M2M Verticals and Security

Fleet Management:

Vehicle diagnostic: Accuracy of Information
Connected Vehicle: Real accident reporting
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Telemetry:

Smart meter sensors: Electricity meters
SCADA system: Building management
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Embedded systems:
Lack of authentication and encryption
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Mobile Commerce: POS, Wireless ATM
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Video Surveillance:
Security Cameras, image analysis
M2M Security

- Secure Data Aggregation
  - Secure Localization

- Secure Routing

- Key Management
  - Access Control

- Crypto Algorithms
  - Cryptanalysis

- Attacks –
  - DoS,
  - Sybil,
  - Wormhole,
  - Node Replication,
  - ....

- Other security issues:
  - Privacy,
  - Intrusion Detection,
  - Secure Auditing.

Layers:
- Application Layer
- Middleware Layer
- OS
- Hardware
Alert Delivery

Common Alert Types:
- SMS
- Email
- Pager

E.g. Oil and Gas Industry, Healthcare
Alert delivery is critical
Backup delivery method and channel should be used
Delivery confirmation should be required

Guaranteed Message Delivery
Non IP based SMS will always be delivered when the device becomes available, but not always in a timely fashion.
SMS Cellular Network

SMS over MSC:

Messages are stored in the network until the destination cell phone becomes available

SMS over SMTP:

Lack of speed, non-guaranteed delivery, Email simply wasn't designed to provide quick, guaranteed delivery.
Location Aware SMS Delivery

Network Condition & Location Monitoring

Mobile Device

SMS Cellular Network

GMSC gateway to TCP/IP

Cell Tower

MSC

SMSC

MSC

Cell Tower

Mobile Device
Location Assisted SMS Delivery

Query Location

User Location DB

Location response

SMSC

no → Backup

yes → SMSC
Guaranteed Alert Delivery

Network Condition Monitoring

- Network Condition Monitoring
  - yes: Notify BTS, OK to receive
  - no: Notify BTS, fallback to backup method

Adjust monitoring interval
Trust Zone

TrustZone® technology is a system-wide approach to security on high performance computing platforms for a huge array of applications including secure payment, digital rights management (DRM), enterprise and web-based services.
Malicious nodes: 5, 8
Route is selected based on reward score
Learning system is needed: e.g. LCS, genetic algorithms
Q & A