Industrial Control System (ICS) Security Using TNC Technology

September 18, 2014, 1:00PM EDT
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Questions?
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David Mattes, Founder and CTO, Asguard Networks

Mattes has developed network security appliances that help companies connect their industrial assets in a way that is highly secure, cost-effective and easy-to-use. He is the founder and lead developer for ompad, an open source IF-MAP server. Prior to Asguard Networks, Mattes was with The Boeing Company where he developed architecture and implementations for managing legacy connectivity for industrial control systems, embedded wireless controllers for hydraulic testing, a secure mobile factory workstation, and other applications.

Steve Venema, PhD, Associate Technical Fellow, Boeing

Venema has worked on large-scale ICS and SCADA networking and security challenges in Boeing’s manufacturing facilities over the past 10 years. He is the primary architect of the internally developed solutions which align with the new specifications discussed in this webinar, and which are used across hundreds of manufacturing systems in Boeing today. He is also a co-author for related standards activities including the TCG ("Metadata for ICS Security") and ISA (TR100.15.01 "Backhaul Architecture Model: Secure Connectivity Over Untrusted or Trusted Networks").

Eric Byres, CTO and Vice President Engineering, Tofino Security

Byres is recognized as one of the world's leading experts in the field of SCADA security, and with a background as a process controls engineer, he has a unique combination of deep technical knowledge plus practical field experience. He has written extensively on Stuxnet, leads various industry standards groups and has consulted with governments and enterprises.

Lisa Lorenzin, Principal Solution Architect, Juniper Networks

Lorenzin specializes in security and mobility solutions and has worked in a variety of Internet-related roles since 1994, with more than a decade of that focused on network and information security. She is currently concentrating on enterprise security - including network segmentation, end-to-end identity-based access control, and integration of mobile security.
Industrial Control Systems Network

Control and Monitoring
- HMI
- MTU

Backup Control Center

Internet

TCP
MODBUS

Substation ICS

PLC
RTU

Substation ICS

PLC
RTU

CDMA
Modem
Firewall
Infrastructure Challenges

- Designed for safety, not security
- Standard applications, OSes seldom patched
- Susceptible to a variety of attacks
- Lack forensic capabilities
- Logging for operations, not communication
Goal: Integrated ICS & IT Intranet
Integration Drivers

- Geographically dispersed systems
- Responsiveness
- Business agility
- Cost savings
- Compliance
- Security
- Safety
Solution: Secure Overlay Network

SECURE OVERLAY NETWORK

VIRTUAL PRIVATE LAN OVERLAY

ICS DEVICES

CELLULAR NET

WiMAX SUBNET

BHI

SUBNET B

SUBNET A

ENTERPRISE INTRANET

PUBLIC INTERNET
Overlay Challenges

- Dynamic environment
- Certificate provisioning
- Visibility
- Multiple administrators
- Access control policies
TCG: Standards for Trusted Systems

- Virtualized Platform
- Mobile Phones
- Printers & Hardcopy
- Network Security
- Security Hardware
- Desktops & Notebooks
- Servers
- Authentication
- Storage
- Applications
  - Software Stack
  - Operating Systems
  - Web Services
  - Authentication
  - Data Protection

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• Open Architecture for Network Security
  • Completely vendor-neutral
  • Strong security through trusted computing
  • Original focus on NAC, now expanded to Network Security

• Open Standards for Network Security
  • Full set of specifications available to all
  • Products shipping since 2005

• New Standard for Industrial Control Systems
  • Aligns with ISA100.15 Backhaul Network Architecture
  • Aligns with IETF standards for PKI and identity-based comms
## Problems Solved by TNC

### Network and Endpoint Visibility
- Who and what’s on my network?

### Endpoint Compliance
- Are devices on my network secure?
- Is user/device behavior appropriate?

### Network Enforcement
- Block unauthorized users, devices, or behavior
- Grant appropriate levels of access to authorized users/devices

### Security System Integration
- Share real-time information about users, devices, threats, etc.

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**Compliance Service**

**Access Control Service**

**Orchestration Service**
Dynamic Connectivity and Trust Management

**Backhaul Connectivity**
- Any link type: Ethernet, Cell, WiFi, WiMax, SatCom, etc.
- Backhaul authentication

**Protection**
- Authentication
- Confidentiality
- Integrity
- Policy Enforcement

**Transparency**
- Existing ICS protocols
- Layer 2 VPLS

**IFF-Map Coordination**

**Untrusted IP Network**

**Isolation Boundary**

**IP Over Backhaul**

**Ethernet**

**Field Worker**

**ICS Ops Center**

**Field ICS**

**Overlay Network**
Solution – Intelligent Isolation

Provisioning Client

Attacker

Corporate Network

OpenHIP Overlay (virtual ‘wire’)

MAP Server

Enforcement Point

HMI Computer

OpenHIP Overlay (Virtual “Wire”)

Tofino Endbox

PLC

Tofino Endbox

Enforcement Point
Next Steps and Call to Action


• Design ICS security solutions customized for your unique environments.

• Contact vendors and insist on acquiring TCG-certified ICS security solutions based on the TNC and ISA standards.

• Deploy solutions in pilot first, observe and correct issues, then deploy into production.

• For more information on TCG technologies and architects guides, visit www.trustedcomputinggroup.org
Questions?

Post your question now.

David Mattes
Asguard Networks

Steve Venema
Boeing

Eric Byres
Tofino Security
Specifications:

- TNC IF-MAP Metadata for ICS Security, Version 1.0:
  [http://www.trustedcomputinggroup.org/files/static_page_files/8073E5D9-1A4B-B294-D0CD4D06B6C53D1D/IFMAP_Metadata_For_ICS_Security_v1_0r45.pdf](http://www.trustedcomputinggroup.org/files/static_page_files/8073E5D9-1A4B-B294-D0CD4D06B6C53D1D/IFMAP_Metadata_For_ICS_Security_v1_0r45.pdf)

- TNC IF-MAP Binding for SOAP, Version 2.2

Architect's Guide:

- ICS Security Using TNC Technology:

Resource Documents:

- TNC IF-MAP Metadata for ICS Security Frequently Asked Questions:
  [http://www.trustedcomputinggroup.org/resources/tnc_ifmap_metadata_for_ics_security_10_faqs](http://www.trustedcomputinggroup.org/resources/tnc_ifmap_metadata_for_ics_security_10_faqs)

- TCG Specifications for Network Segmentation: