Cybersecurity of Railway Control Systems

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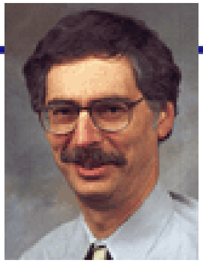
PROCESS CONTROL SYSTEMS FORUM

Collaborating to Advance Control System Security

About the Speakers



Dave Teumim

- CISSP (Certified Information System Security Professional)
- MS in Chemical Engineering
- Author of book “Industrial Network Security” published by ISA
- Independent Consultant

Fred Woolsey

- BS in Electrical Engineering, MEng in Systems Engineering
- Chair of IEEE RTVISC Working Group 9
- 30+ years in railway industry with LIRR, ABB/Adtranz, LTK
- Member IEEE, ISA, ACM

Introducing Rail Transit

- **Transport passengers, not goods**
  - Usually run by public agencies
  - Freight railways transport goods
    - Usually privately owned
- **Other transportation modes**
  - Air
  - Highway
  - Shipping

Types of Rail Transit

RailPictures.Net - Image Copyright © Brian M. Weinberg - www.railfanwindow.com

Commuter Rail

Light Rail

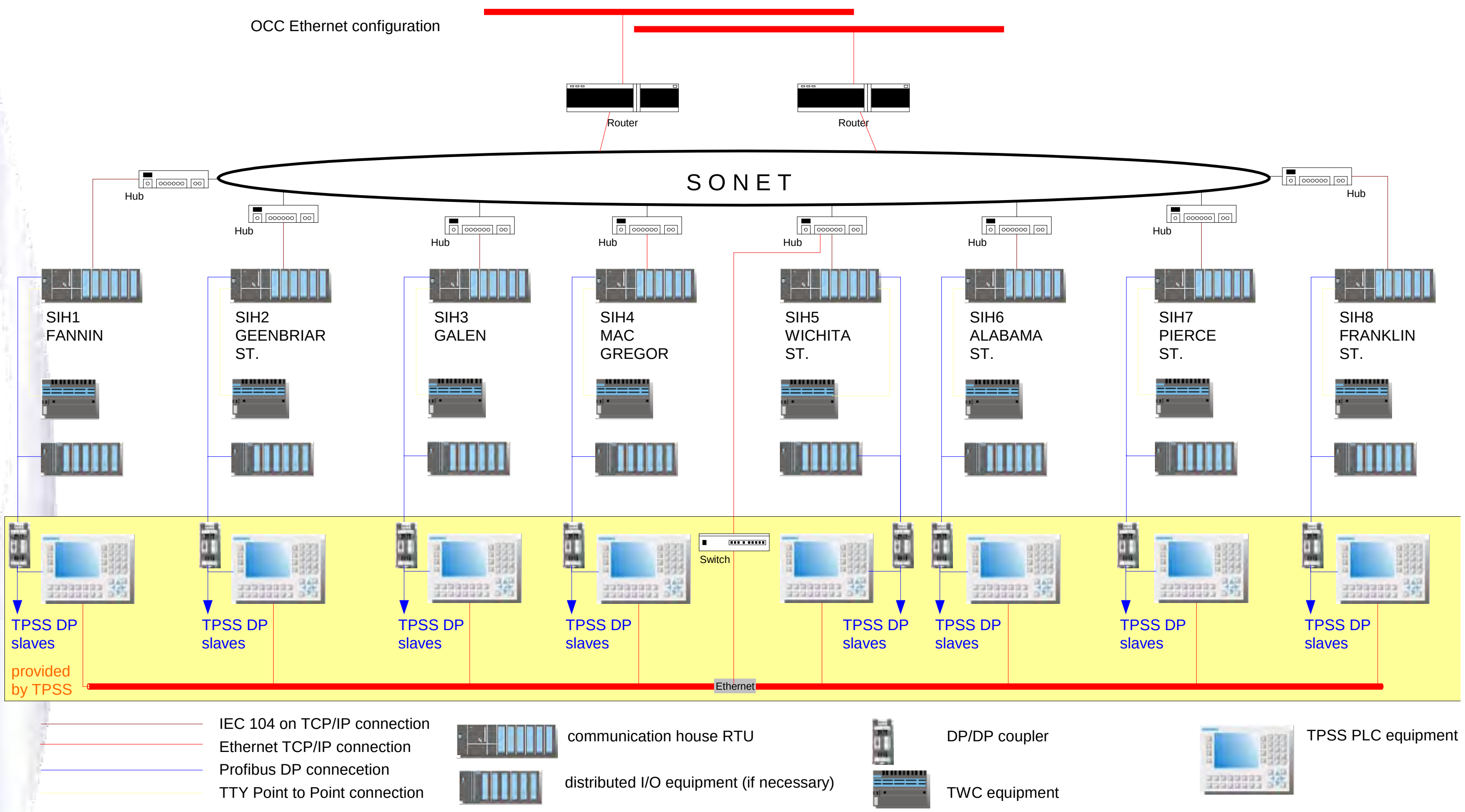
Heavy Rail (Metro)

(Light Rail Image Courtesy of Houston Metro)

Railway Control Systems Use:

- SCADA
- PLC’s
- Fieldbus
- Sensors (speed, pressure, temperature), actuators (motors, valves),
- Windows XP; embedded on locomotives and coaches, Windows workstations in control centers
- “Vital” = Intrinsically Safe (signaling, interlocking, train control)

Example Light Rail Control System



(Network Diagram Courtesy of Metro)

Do These Names Sound Familiar?

- **Rail control system vendors include:**
  - Siemens
  - Invensys
  - GE
  - Rockwell Automation

What are Areas for Applying Control System Security ?

- Wireless (Computer Based Train Control)
- Wireless (Telemetry)
- Networked Ticket Vending Machines
- SCADA (electric traction, signals)
- Control system/enterprise connections

Introducing APTA—Primary Industry Organization for Rail Transit

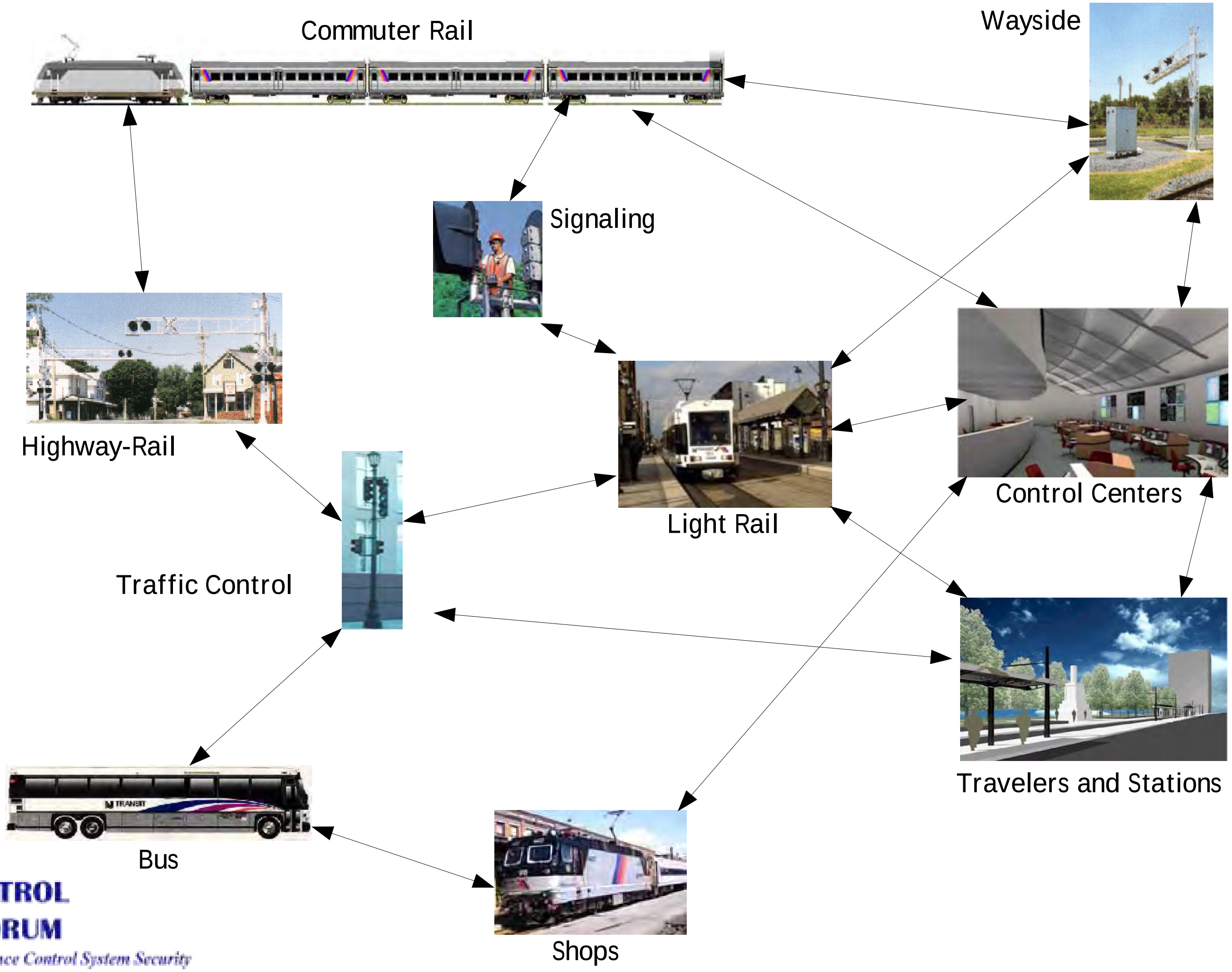
AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

- 1,500 Member Organization
- Members Serve More Than 90% Of Public Transit Riders In U. S. And Canada
- Provide Services To Members That Create A Safer And More Secure Environment For Public Transportation Riders, Workers And The Public At Large.

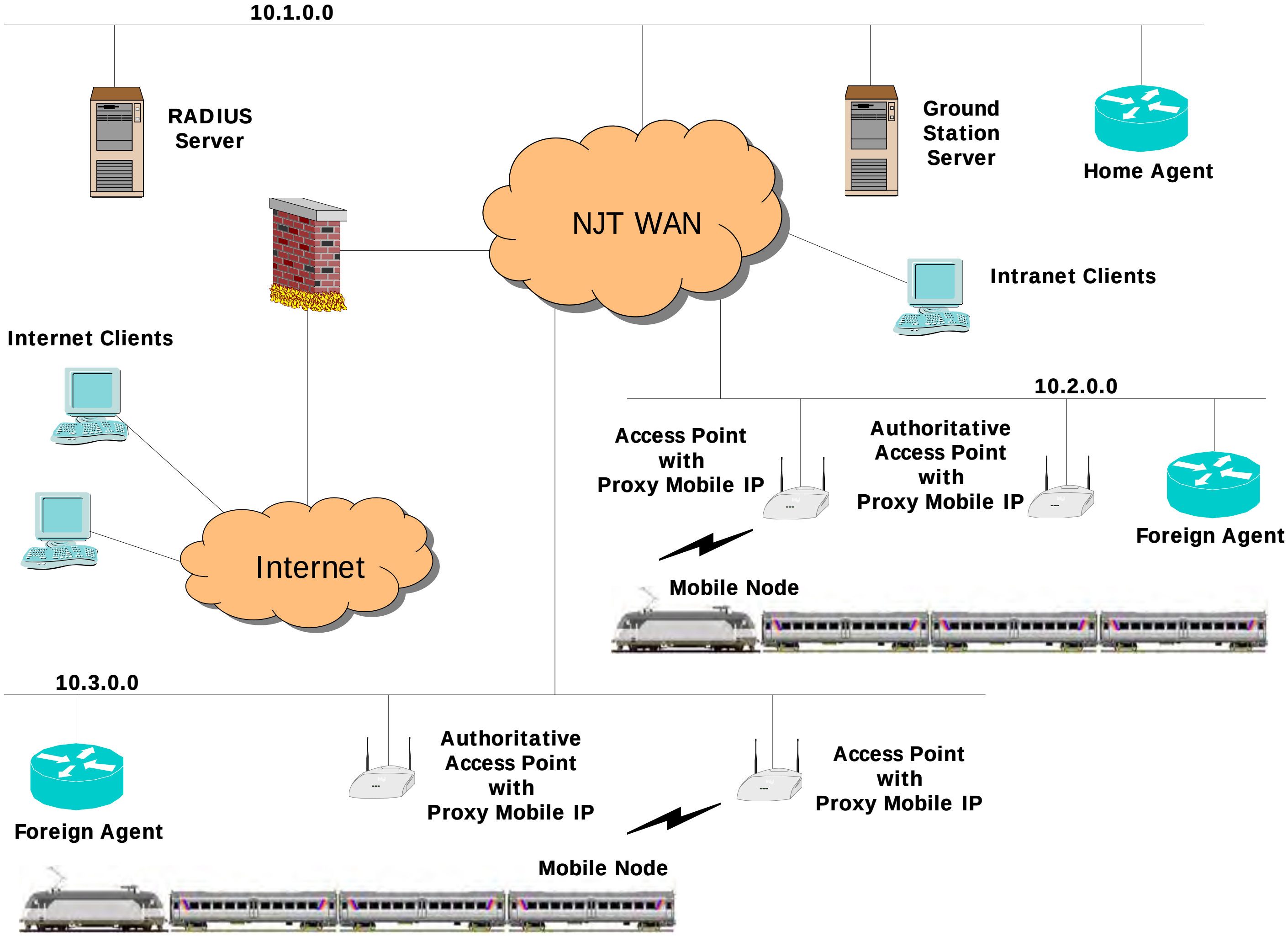
APTA Industry Activities

- Standards committees
- Technical forums
- Conferences and exhibitions

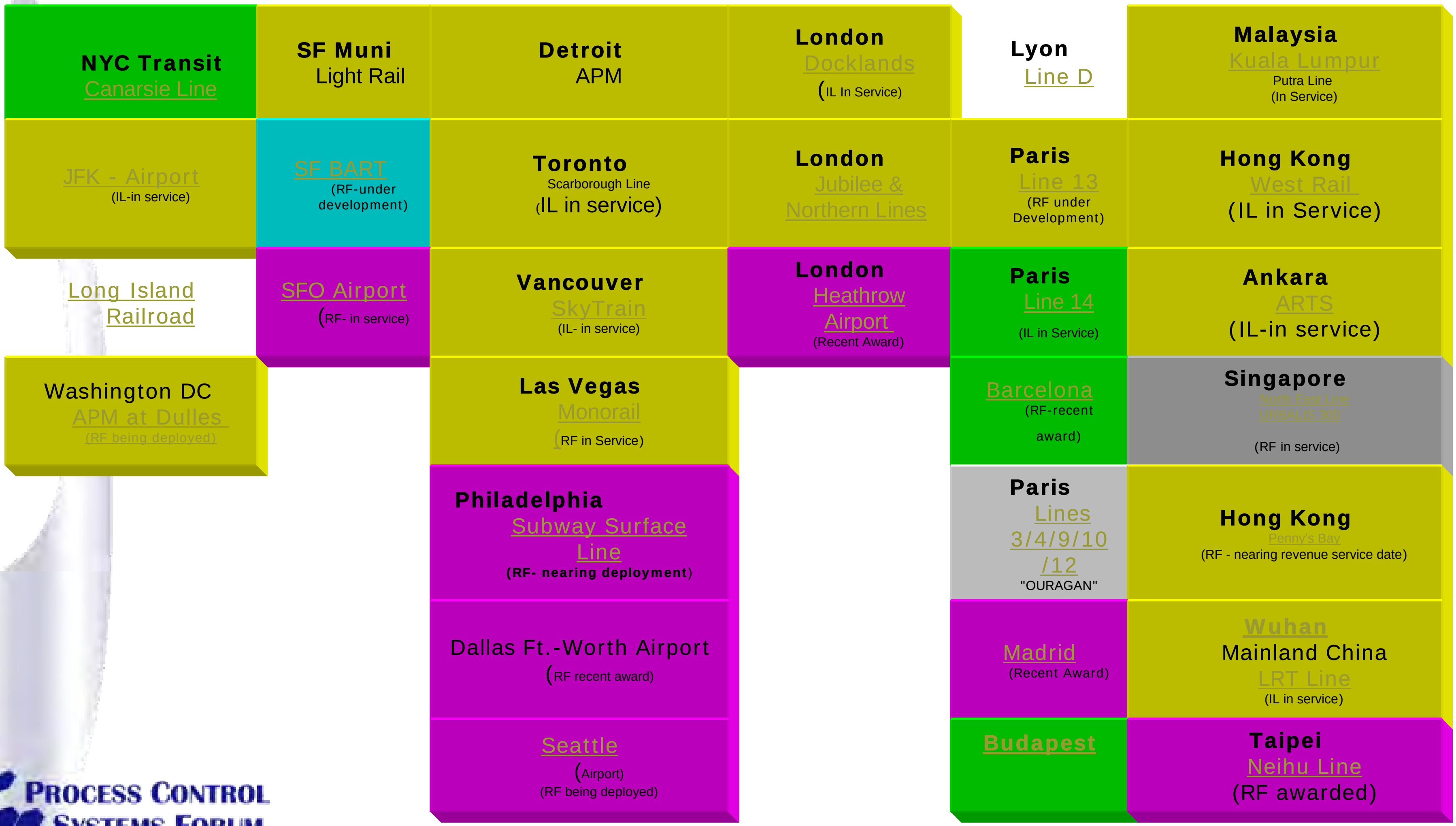
Rail Transit Communication Links



Wireless (Telemetry)



Wireless (CBTC)



NYC Transit
Canarsie Line

JFK - Airport
(IL-in service)

Long Island
Railroad

Washington DC
APM at Dulles
(RF being deployed)

SF Muni
Light Rail

SF BART
(RF-under development)

SFO Airport
(RF- in service)

Detroit
APM

Toronto
Scarborough Line
(IL in service)

Vancouver
SkyTrain
(IL- in service)

Las Vegas
Monorail
(RF in Service)

Philadelphia
Subway Surface Line
(RF- nearing deployment)

Dallas Ft.-Worth Airport
(RF recent award)

Seattle
(Airport)
(RF being deployed)

London
Docklands
(IL In Service)

London
Jubilee &
Northern Lines

London
Heathrow Airport
(Recent Award)

Lyon
Line D

Paris
Line 13
(RF under Development)

Paris
Line 14
(IL in Service)

Barcelona
(RF-recent award)

Paris
Lines 3/4/9/10/12
"OURAGAN"

Madrid
(Recent Award)

Budapest

Malaysia
Kuala Lumpur
Putra Line
(In Service)

Hong Kong
West Rail
(IL in Service)

Ankara
ARTS
(IL-in service)

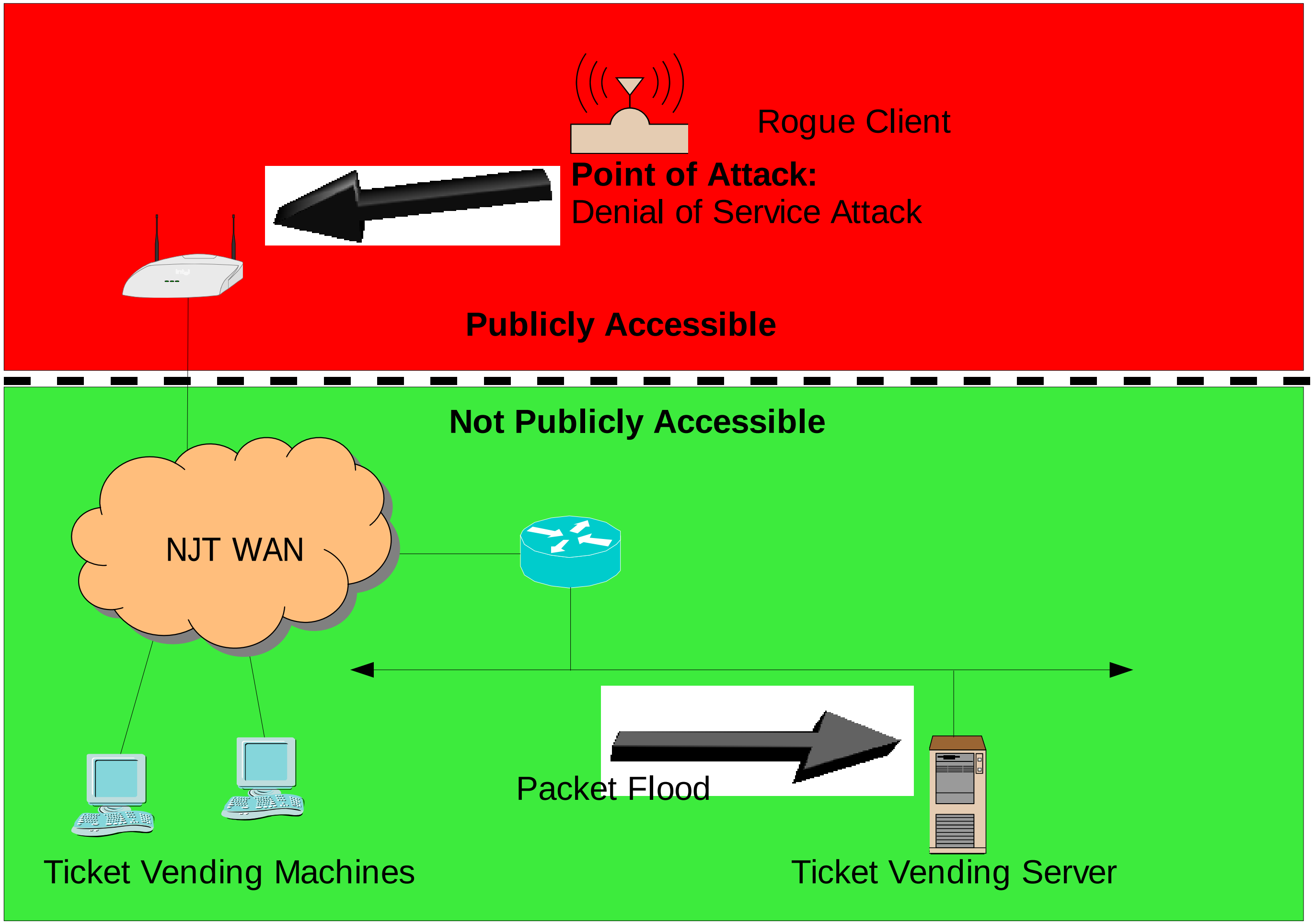
Singapore
North East Line
URBALIS 300
(RF in service)

Hong Kong
Penny's Bay
(RF - nearing revenue service date)

Wuhan
Mainland China
LRT Line
(IL in service)

Taipei
Neihu Line
(RF awarded)

Vulnerabilities



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Railway Age Magazine

- First Article on Rail Control Security
- January 05 Railway Security Conference
- January 06 Railway Security Conference

Collaboration with the PCSF Community

- **Technical Interchange**
- **Wireless Issues/Technology – hot area**
- **Transportation – potential market area for new control security technologies**

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