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Implementing the Public WiFi Service on the Dubai Metro

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Nomad Digital

- Broadband communications solutions to the rail industry
- Founded in 2002 – Newcastle, UK
- Deployed world's first genuine passenger WiFi deployment
- Projects across Europe, USA, Dubai, India, China, Australia, South Africa

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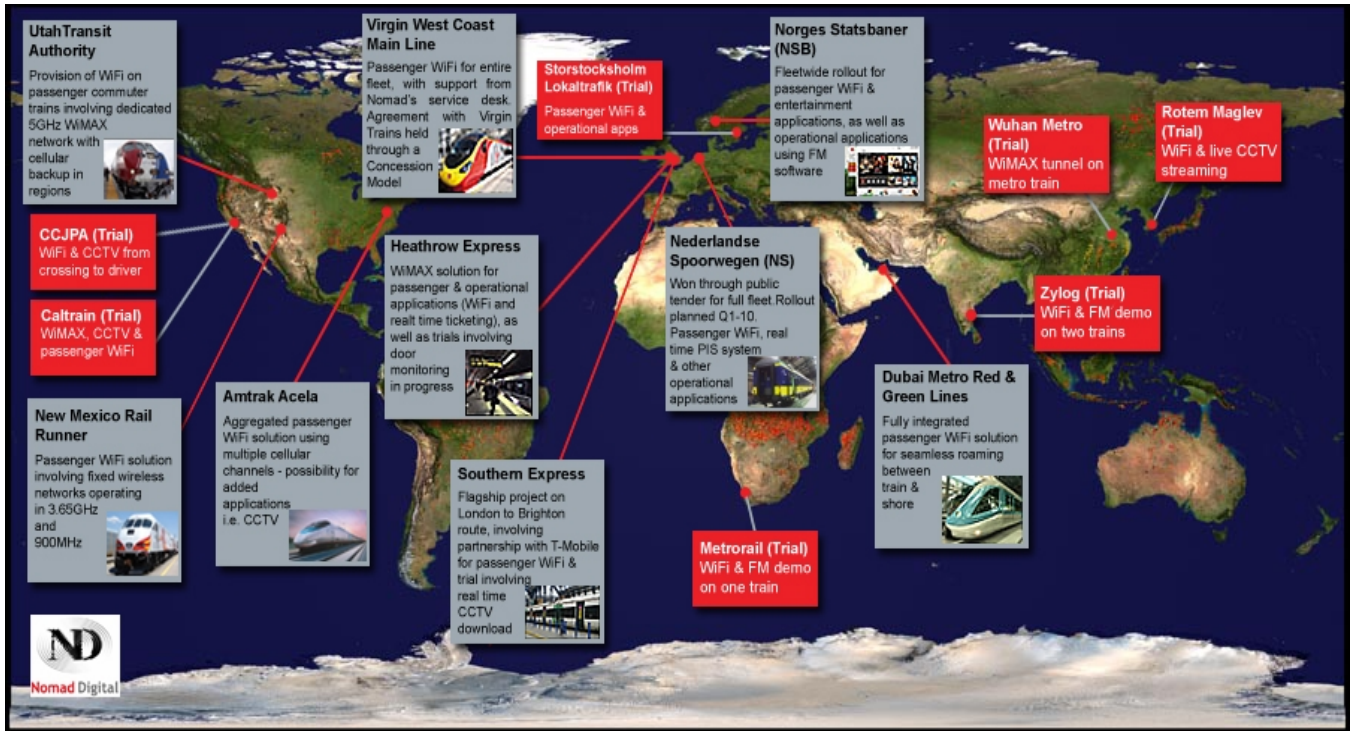

- Global Player
- 25+ projects
- Market Leader
- Passenger Solutions
- Operational Solutions

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In-Vehicle

Wide Area Networks / Wayside

Seamless Switching

Fixed Wireless Networks (e.g. WiMAX)
GHz: 5, 4.9, 3.65, 3.5, 2.5, 2.3, 1.5, 700MHz

Access Network

Cellular Networks (GSM & CDMA)
HSPA+, GPRS/EDGE, CDMA EV-DO Rev A

Access Network

Legacy / Proprietary Networks

Access Network

NOC / Shore

Internal IT Systems

Home Agent

Fleet Manager

Passenger Solutions

- Entertainment
  - Multimedia
  - Infotainment
  - Internet Access
  - Payment Services

- Information
  - Intelligent PIS
  - Journey Portal
  - Location Information
  - Location Advertising

Dubai Metro

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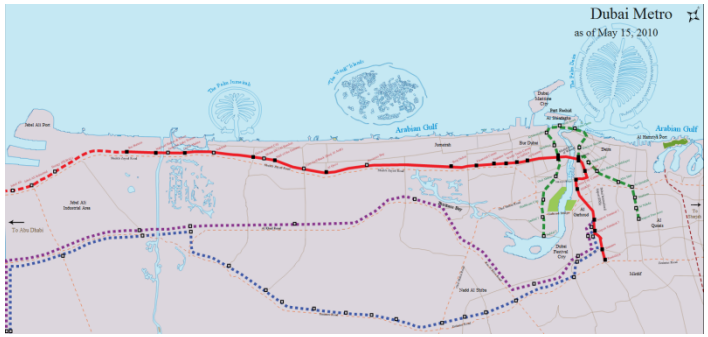
Dubai Metro – Project Overview

- Customer – du (telecoms operator) on behalf of RTA
- Primary Application: passenger WiFi internet access
- TOC motivation: leading edge technology
- du motivation: revenue (under concession), customer loyalty & branding
- Fleets: 79 Kinki Sharyo trains (5 car)
- Routes: Red & Green lines (city of Dubai)
- Deployment: 18 months from design approvals
- Launch: Sep 2009



Dubai Metro – Nomad Role

- Train communications platform
- Train design, approvals & project mgt
- Interface with Kinki Sharyo (for partial factory pre-fitment)
- Station WiFi deployment (48 stations)
- Interface with Motorola (re mobile WiMAX CPE integration)
- Network Operations Centre (in du facilities)
- In-house train installation team
- Operate end-to-end solution

Climatic extremes: heat & sand

Dubai Metro – Passenger WiFi

- Service Availability: throughout train; all 3 classes
- Brand/Service Provider: du
- Pricing:
  - for-pay in all classes
  - approx Euro 1.25 / hour for pay as you go
- Access: via on-train landing page/portal
- Mobility: seamless station platform to on-train session mobility

Dubai Metro – Technology Deployed

- On-Train
  - Nomad 3500 CCU
  - WANs: 3G & 802.16e (“WiMAX”)
  - LAN: Wireless inter-carriage links
  - Seamless station platform to on-train wireless handover
- Trackside:
  - Public 3G networks
  - Interface with du’s dedicated Mobile WiMAX network

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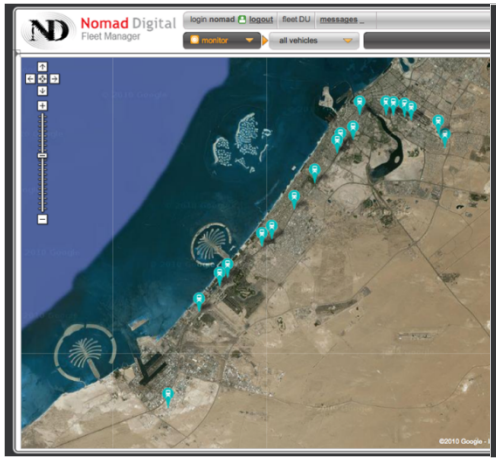
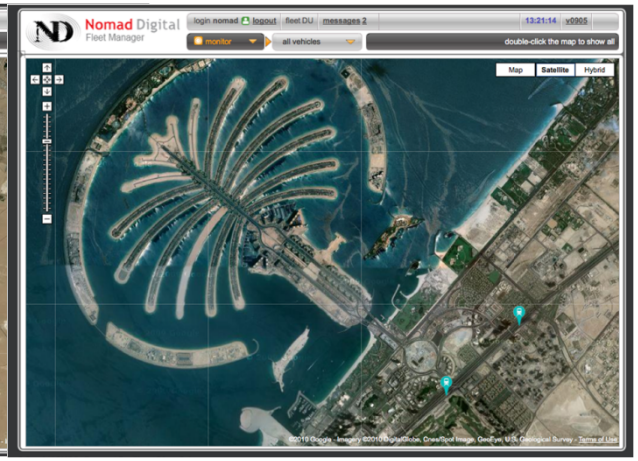
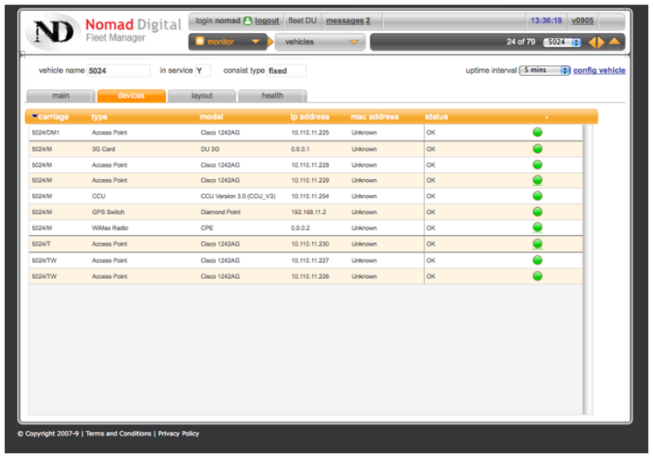
Dubai Metro – Operation

- All equipment remotely monitored in real-time by Nomad service desk
- Nomad 2nd and 3rd line support in country







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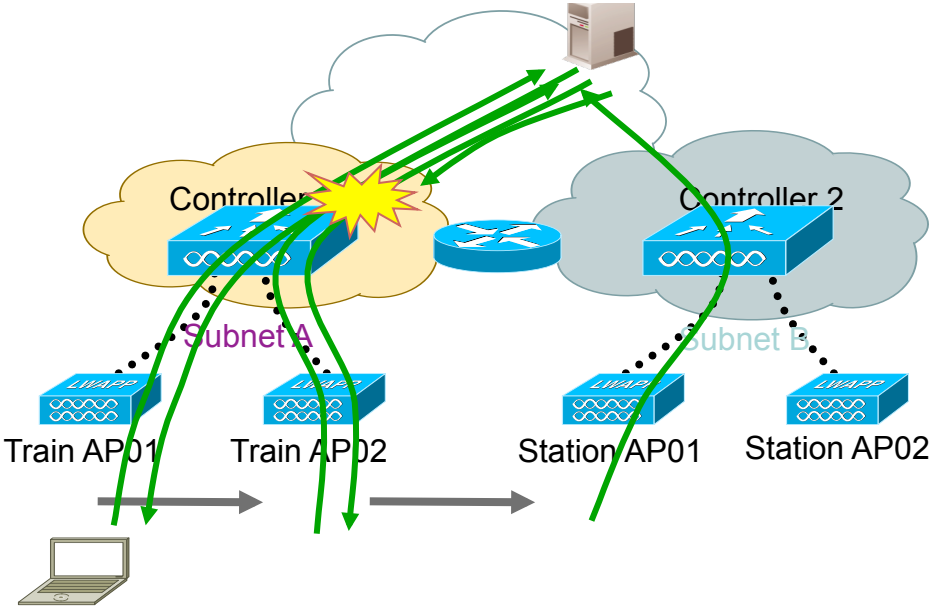
Brief overview of Seamless Mobility solution for the Dubai Metro

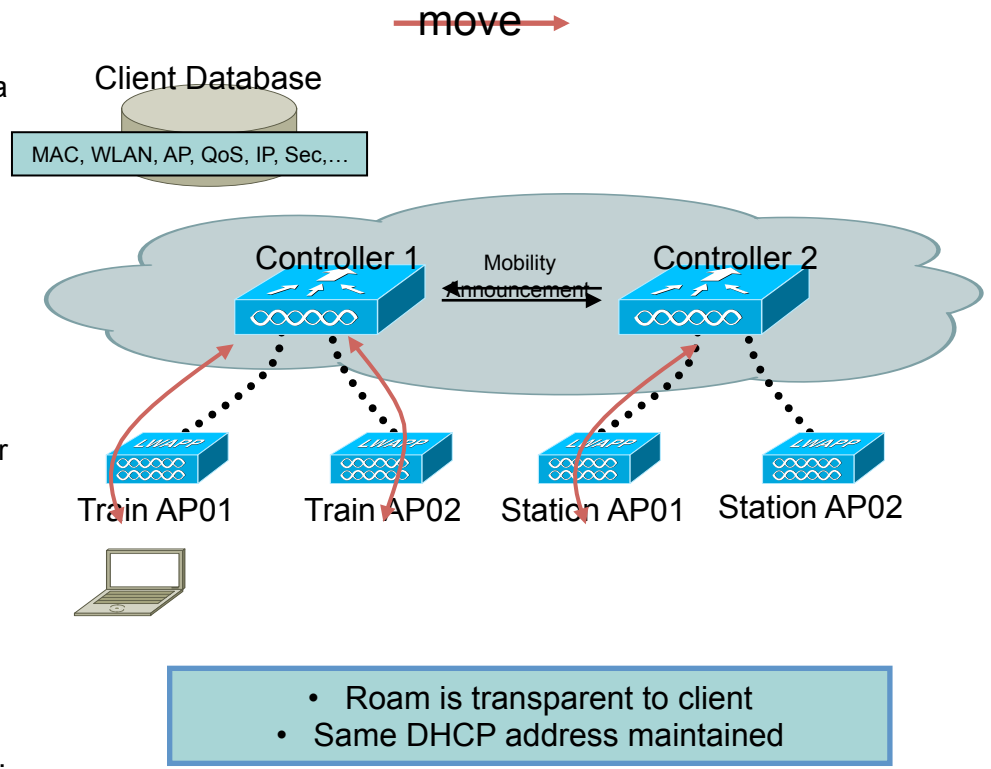
The need for Client Mobility

- Wireless LAN is not only about wire-less
- Need for mobility, and not only “hotspot” connectivity
- Mobility is when a client move from one Access Point to an other
- Access points can be on a single controller or on different controllers
- Clients need to keep IP connectivity (same IP address)
- Client Mobility is mandatory for some applications (Voice, Video, Business Applications, …)



Layer 2 Mobility

- Nomad were asked to design a network that would allow a user to roam seamlessly between Train and station and vice versa, maintaining their IP address and their session.
- To do this, all wireless controllers were put in the same Mobility Group
- In this example a wireless client on the Dubai Metro connects to Train AP01 on Controller 1, where a client database entry is then created on the controller.
- The wireless client then roams to Train AP02 on Controller 1 simulating moving from one car to another on board the train.
- Once the client steps off the train onto the station, they seamlessly roam from Train AP02 (Controller 1) to Station AP01 (Controller 2). The controller makes a mobility announcement to other controllers in the Mobility group stating that the client has now roamed. The client database entry for that client is then moved to controller 2.



- Roam is transparent to client
- Same DHCP address maintained

What Next?

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Train operational services – more everyday

Trains are becoming IP devices – but they are not yet on the corporate network….

- Analysing and minimising delay minutes
- Continual condition based monitoring – doors, a/c, brakes, wheels
- Driver performance analysis
- Staff communication
- Passenger information that works
- Remote starting
- OTMR and beyond

LIVETRAIN

Download and Analysis of Data from Trains

Heathrow express

ALSTOM

Virgin trains
Where do you want to be?

BOMBARDIER

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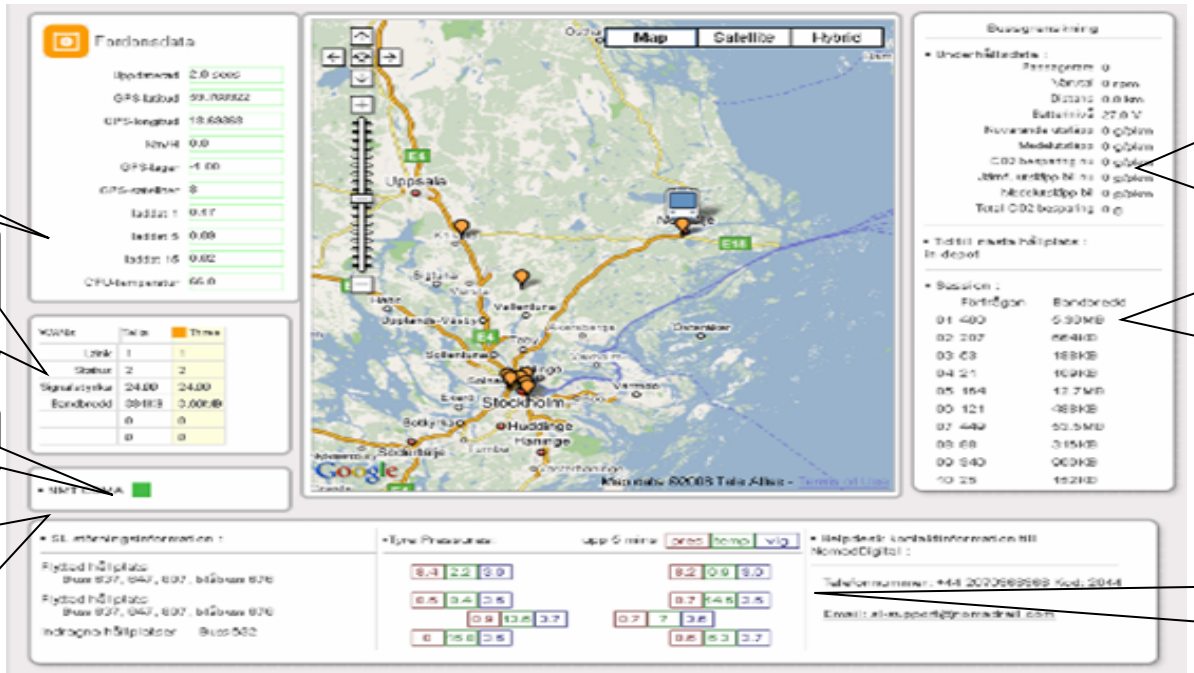
Fleet Manager – Screenshot (SL)

Speed + Location + CCU load

2 x 3G connections from Telia & Three

CDMA Modem status

Journey Delay information (Also notice orange icons on map relating to position)



Feedback from 3rd party devices – relating to CO2 emissions, environmental impact, etc.

Journey planner with updates in real-time – Using Nomad PIS system

Real-time information on tire pressure

Note: All in Swedish!

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Live Passenger Info

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Operational Alerts

www.nomadrail.com/southern/amc

Alert Message Center:

Operator: Hubert Knulst

Alert Type	Severity	time	accepted	By Operator	Details Link
Excessive shocks					
Overspeeding		10:23	☐		
Emergency Break		10:56	☐		
Overspeeding		11:03	☐		
Unusual Stop		11:32	☐		
CCTV Alert		11:57	☐		
Abnormal Heat		11:58	☐		
Door Failure		12:02	☐		
Excessive Shocks		12:10	☐		
Smoke Detection		12:16	☐		
Excessive Shocks		12:34	☐		
Overspeeding		12:48	☐		
Emergency Break		12:54	☐		
Overspeeding		13:11	☐		
Unusual Stop		13:12	☐		
CCTV Alert		14:01	☐		
Abnormal Heat		14:42	☐		
Door Failure		15:49	☐		
Excessive Shocks		15:55	☐		
Smoke Detection		16:09	☐		
Overspeeding		16:45	☐		

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eTicketing

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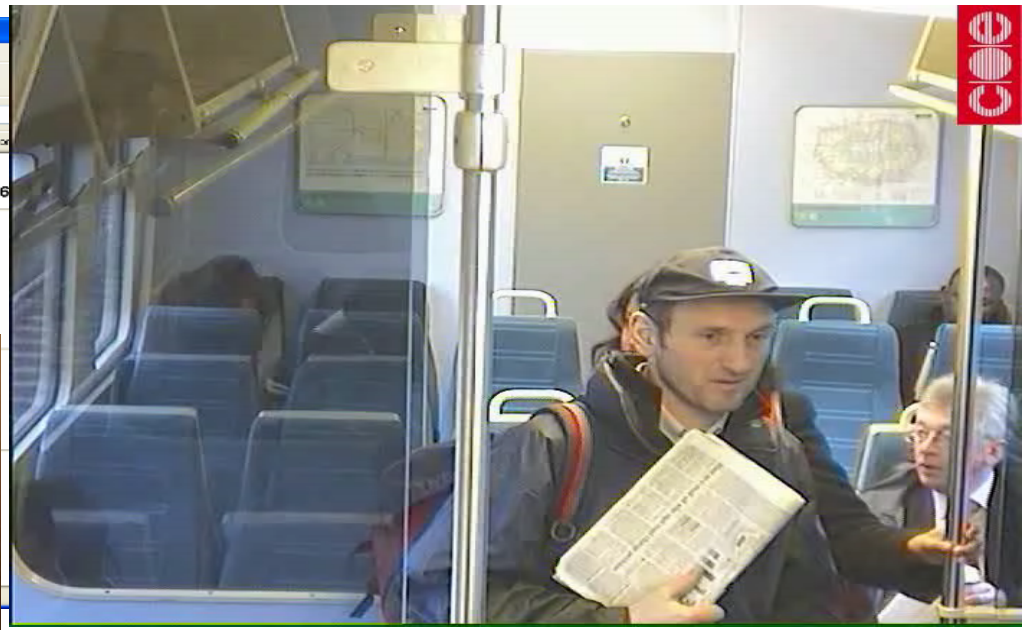
Live High Quality CCTV



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Live Two-Way Video

Other applications

- Energy Monitoring
- Seat Reservation Systems
- OTMR download
- TMS download
- Incident Management
- Door Monitoring
- Driver Monitoring
- On board entertainment

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Thank You.

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