Railway Interiors 2008

Train Communications

for Passenger Entertainment,

Operational Applications & Enhanced Security

Where are we today and where next?

5-10-08

www.nomadrail.com

Nomad Digital

Introducing Nomad

❑ Established in 2002

❑ A pioneer of **real-time**
wireless
broadband
data connectivity
platform and solution
to fast-moving vehicles

❑ More reference broadband communications projects and trials than any other train communications solution provider globally

Nomad Rail Projects (Announced)

Heathrow Express

NSB

Virgin Trains

Caltrain & CCJP

Brighton Express

Dubai Metro

c2c

Frontrunner

Nederland Spoor

Wuhan

Rotem Maglev

Nomad Digital
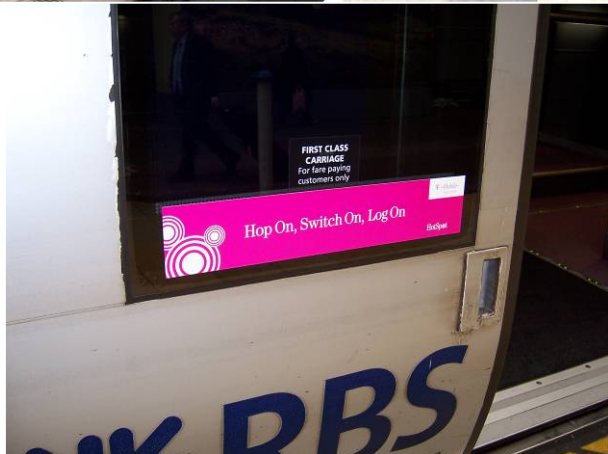
Southern (London to Brighton)

- ❑ Launched April 2005
- ❑ World's first genuine broadband passenger internet service
- ❑ Branded service from T-Mobile HotSpot
- ❑ 14 trains
- ❑ 70km of WiMax

Heathrow Express (London to Heathrow Airport)

- Launched April 2007
- For-Pay Passenger Internet service
- T-Mobile HotSpot
- WiMax in all tunnels under Heathrow - *World First*
- 14 trains
- Usage well above expectations
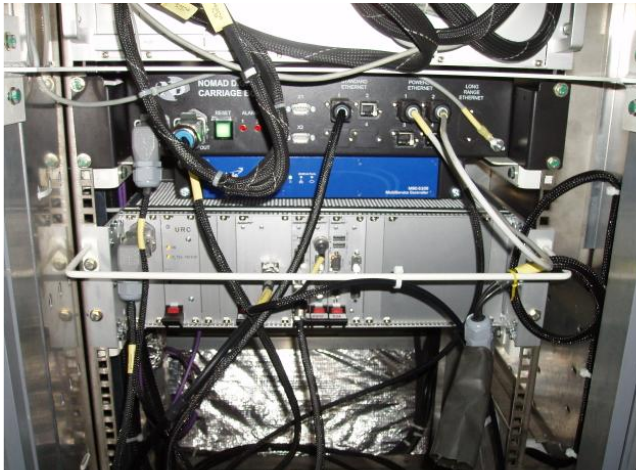
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Virgin Trains (West Coast Mainline)

- ❑ 74 trains
- ❑ Being deployed
  - – 1 train per week
- ❑ Passenger Internet …&
- ❑ T-Mobile HotSpot
- ❑ >600 km of routes
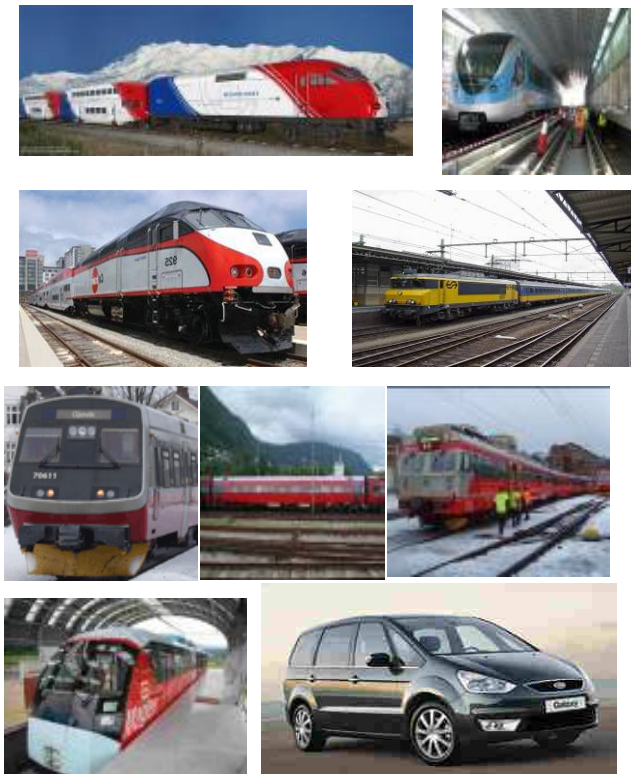- ❑ WiMax + 3G

Virgin Trains (West Coast Mainline)

Projects Summary

	Commercial	Trial/PoC	Go Live
Southern	✓		Q2-05
Caltrain/Capital Corridor		✓	Q1-07
Heathrow Express	✓		Q2-07
NS		✓	Q2-07
c2c		✓	Q3-07
Rotem Maglev (Korea)	✓		Q4-07
Wuhan Metro		✓	Q1-08
SL Buses		✓	Q1-08
Taxis (London)		✓	Q1-08
UTA FrontRunner (US) **NEW**	✓		Q2-08
Virgin WCML	✓		tbd
NSB (Norway) **NEW**	✓		tbd
Dubai Light Rail (UAE) **NEW**	✓		tbd
TBA	✓		tbd
TBA		✓	tbd

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MARKET DEVELOPMENTS

Market developments - Introduction

❑ Step change in interest in train communications solutions

  – Not "if" but "when"

❑ Global phenomenon

  – Needs and approach quite different in each regional market

❑ Market is now starting to be convinced that it can be done

  – many trials now coming to an end

  – now looking at the "how can <u>we</u> do it?"

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Market developments - Introduction

❑ Passenger WiFi was the catalyst

    – customer loyalty/appeal

    – increased ridership

    – enhanced on-board passenger experience

❑ Challenges

    – business case

    – funding

    – internal priorities and constraints

REGIONAL VIEW - NORTH AMERICA

North America - General

❑ Rail ridership is growing in US

– $4.00/gallon (Euro 0.75/litre!) this summer

– Ridership on the ascendancy

– New rail lines being opened up!

– More systems than most Europeans realise

North America - General

❑ Many trials have been conducted

❑ Focus on Passenger Internet access (WiFi)

   – Mostly free to use

❑ Variety of technical solutions

   – Cellular only

   – WiFi mesh

   – WiMax/cellular

North America - General

❑ WiFi everywhere

– demand now for WiFi public transport

❑ Because…

– Passengers are asking for it

– Rail operators see it can attract new riders

– Hard to influence ridership from efficient core operations

– Funding can be found

– Experimental business cases are being considered

North America - General

❑ Growing number of committed projects

    – San Francisco – BART – Extended Metro

    – Utah – FrontRunner – Commuter Rail

    – Boston – MBTA - Metro

    – Dallas-Fort Worth – TRE – Commuter Rail

    – Albuquerque – Railrunner – Commuter Rail

    – Amtrak – Acela – Business Rail

    – …

BART

TRE

Acela

North America – UTA - Frontrunner

❑ Launch April 08

❑ 1st US fully free commercial passenger internet service on trains

  – Free service for service life

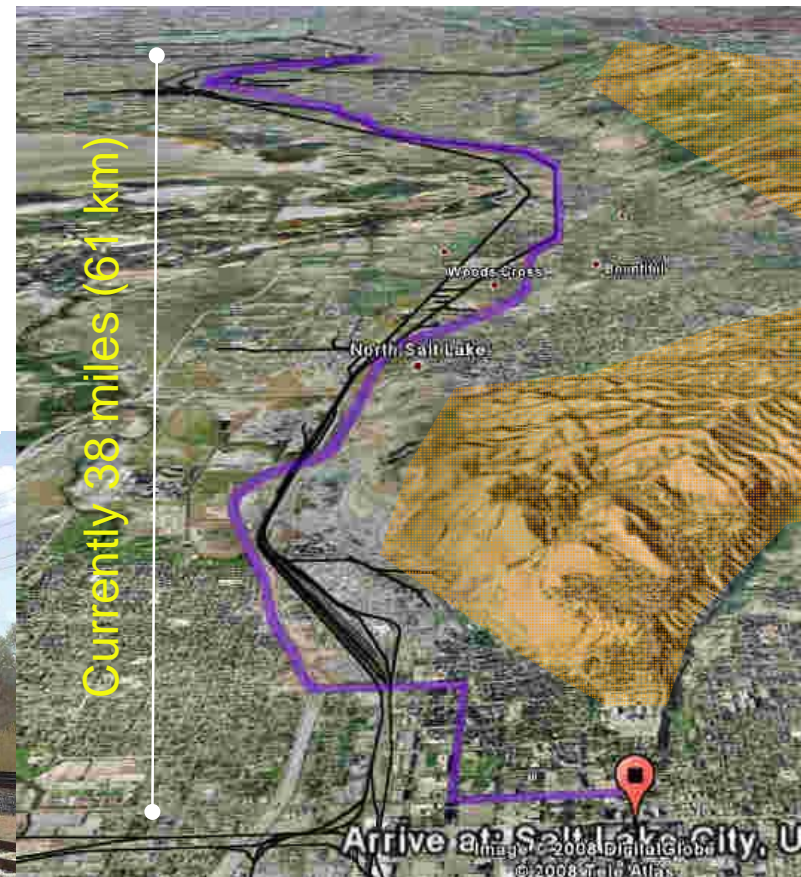❑ One of, if not, <u>the</u> fastest passenger internet service to date

North America – UTA - Frontrunner

- ❑ 61km corridor

- ❑ >95% WiMax (EVDO fallback)

- ❑ Train-shore connection runs at 9 Mbps bi-directionally

Currently 38 miles (61 km)

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Market developments – North America - UTA

Speed test

Market developments – North America - UTA

Free service

UTA User Sessions

Uptake is <u>now</u> circa 12-15%

Estimated ridership – 6000/day
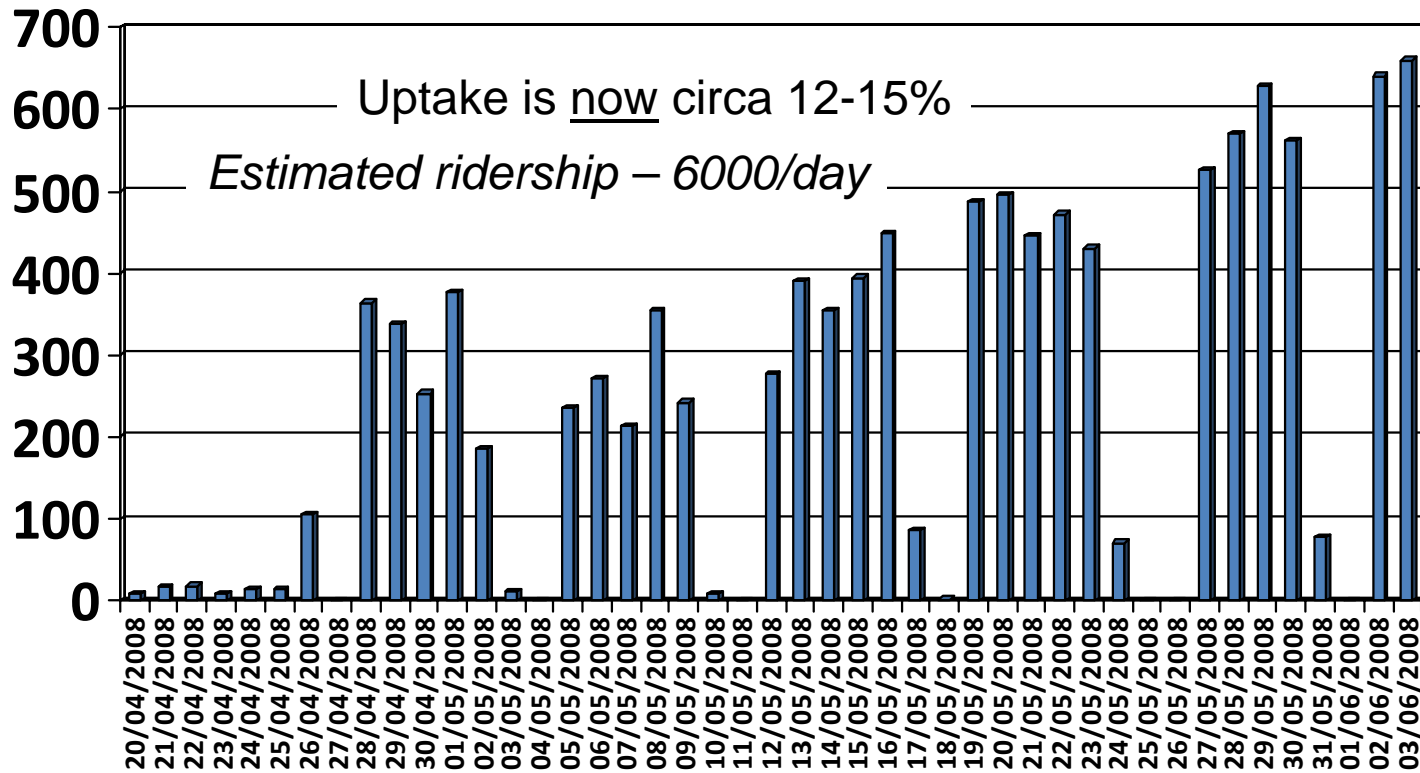
North America - UTA
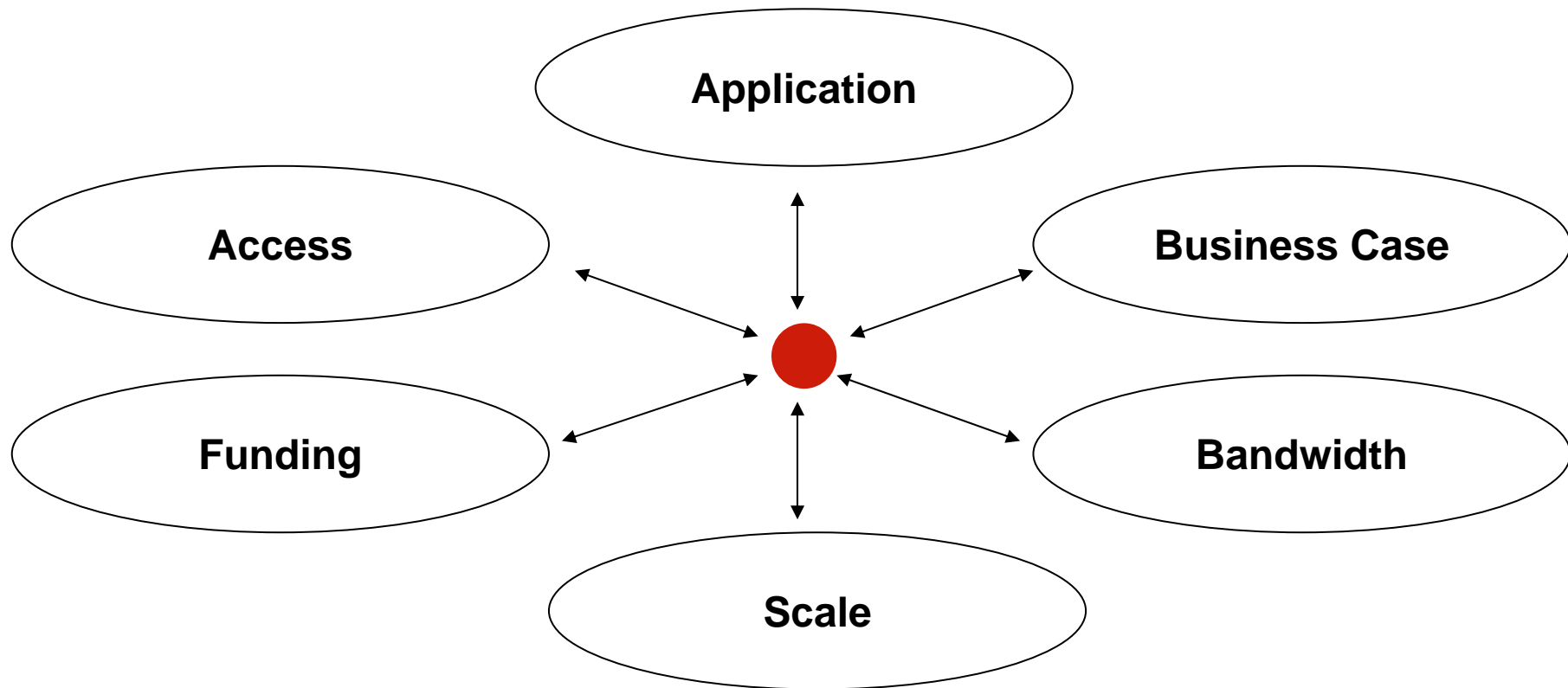
❑ Motivation

   – attracting riders

   – operational applications…

❑ Showcase for Utah

   – Heavily visited by other rail authorities

❑ Catalyst for other "me-too" programmes
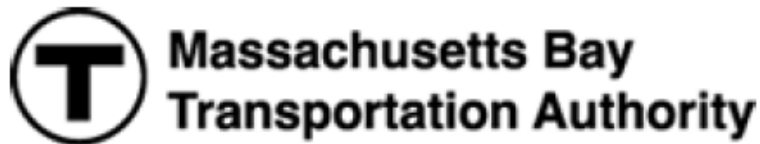
North America - Challenges

Application

Access

Business Case

Funding

Bandwidth

Scale

North America – Challenges - MBTA

Massachusetts Bay Transportation Authority

Framingham/Worcester Commuter Rail customers: Try our free ⊤ Wi-Fi Commuter Rail Connect Test Program!

As one of the first services of its kind on commuter rail trains in the U.S., our free T Wi-Fi Commuter Rail Connect test program strives to provide free Internet access for your laptop, cell phone, PDA or Wi-Fi enabled device. In fact, any commuter rail customer riding in a coach participating in the free T Wi-Fi Commuter Rail Connect Test Program may be able to access the Internet via their enabled laptop or wireless device.
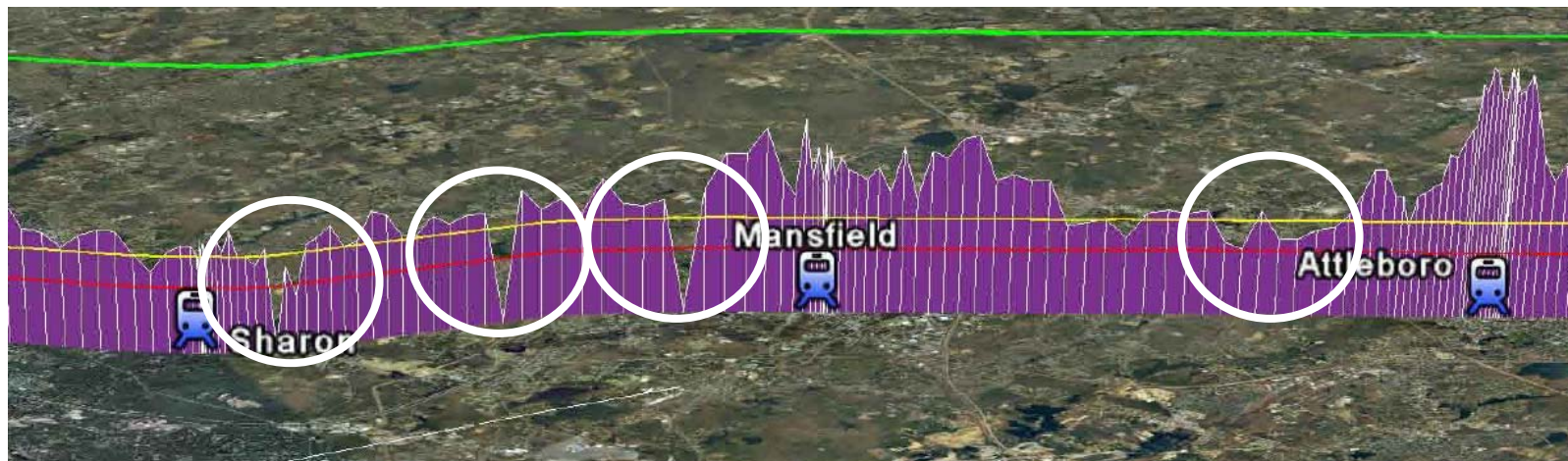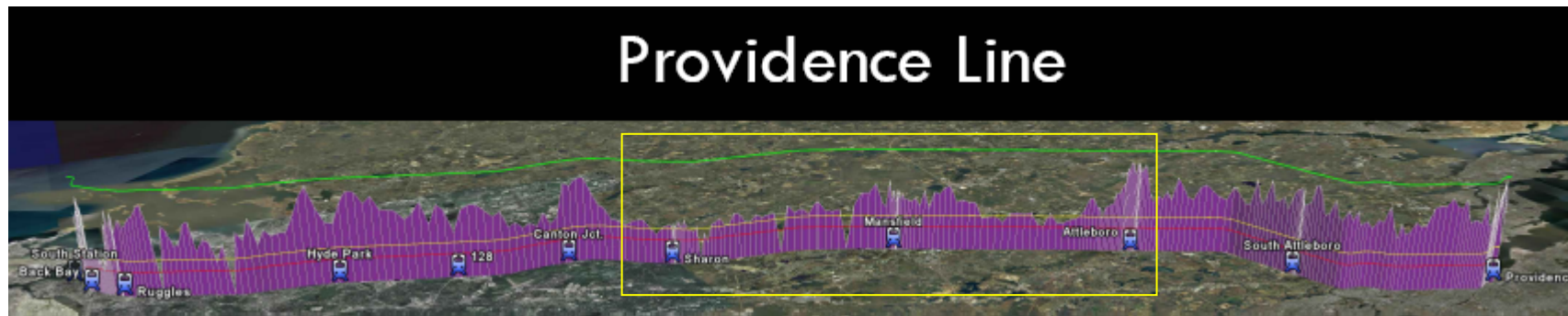
North America – Challenges - MBTA

Wi-Fi Commuter Rail Connect Test Program: Signal Strength Maps

Please note: due to the characteristics of the cellular network, there may be locations where service is intermittent or unavailable. Wi-Fi is solely dependent on the strength of the cellular signal in that area. This is the same effect as when a person experiences a "dropped" call on a cell phone when hitting a "dead zone". Also, during our test program, Wi-Fi enabled coaches may be serving lines other than the Framingham/Worcester line. We invite commuter rail customers to try our free T Wi-Fi Commuter Rail Connect service if they're in a participating coach. The various lines have different signal strength capabilities.
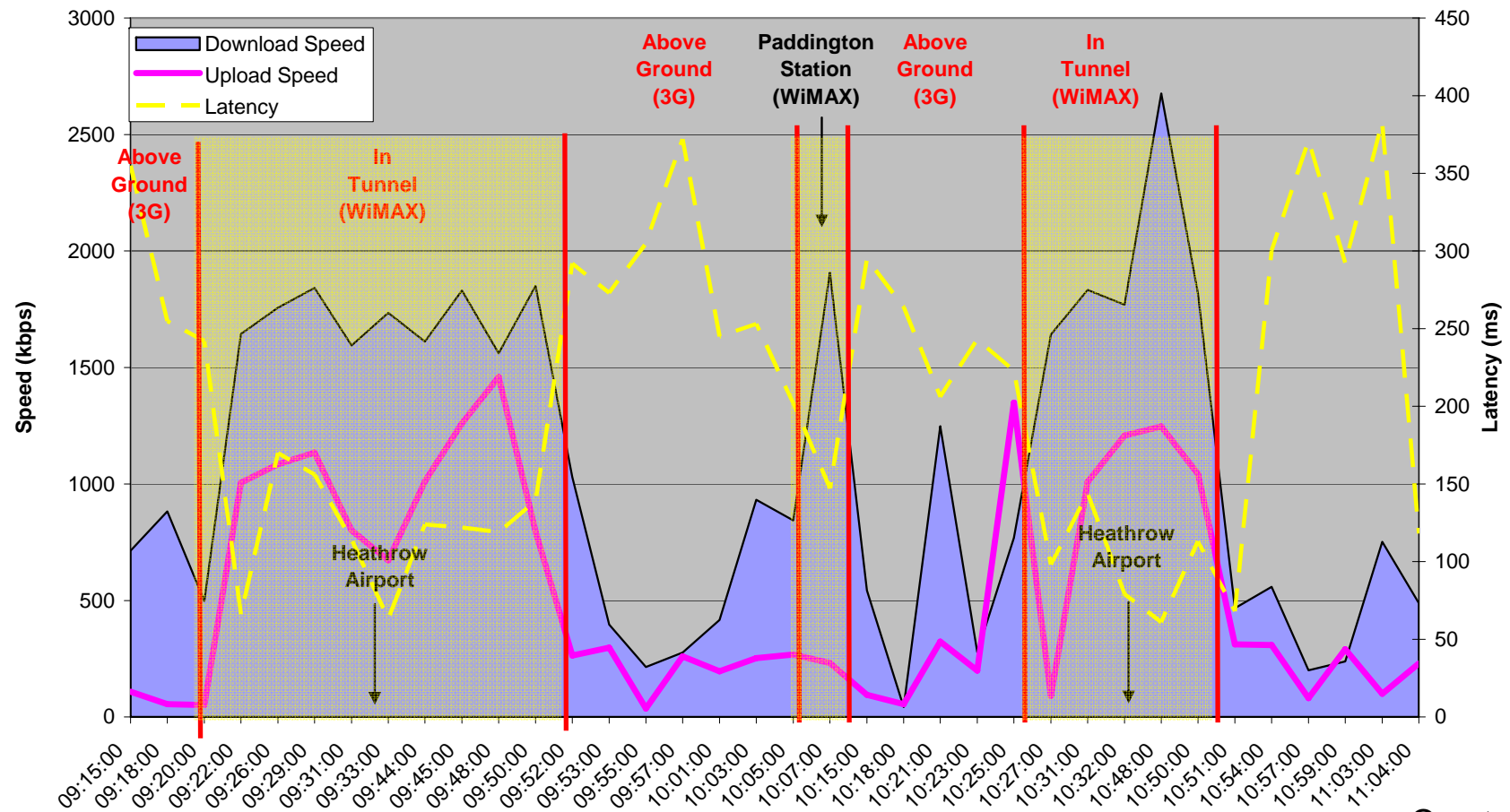
North America – Challenges - MBTA

North America – Challenges

HEX Speed Test (1-10-07)
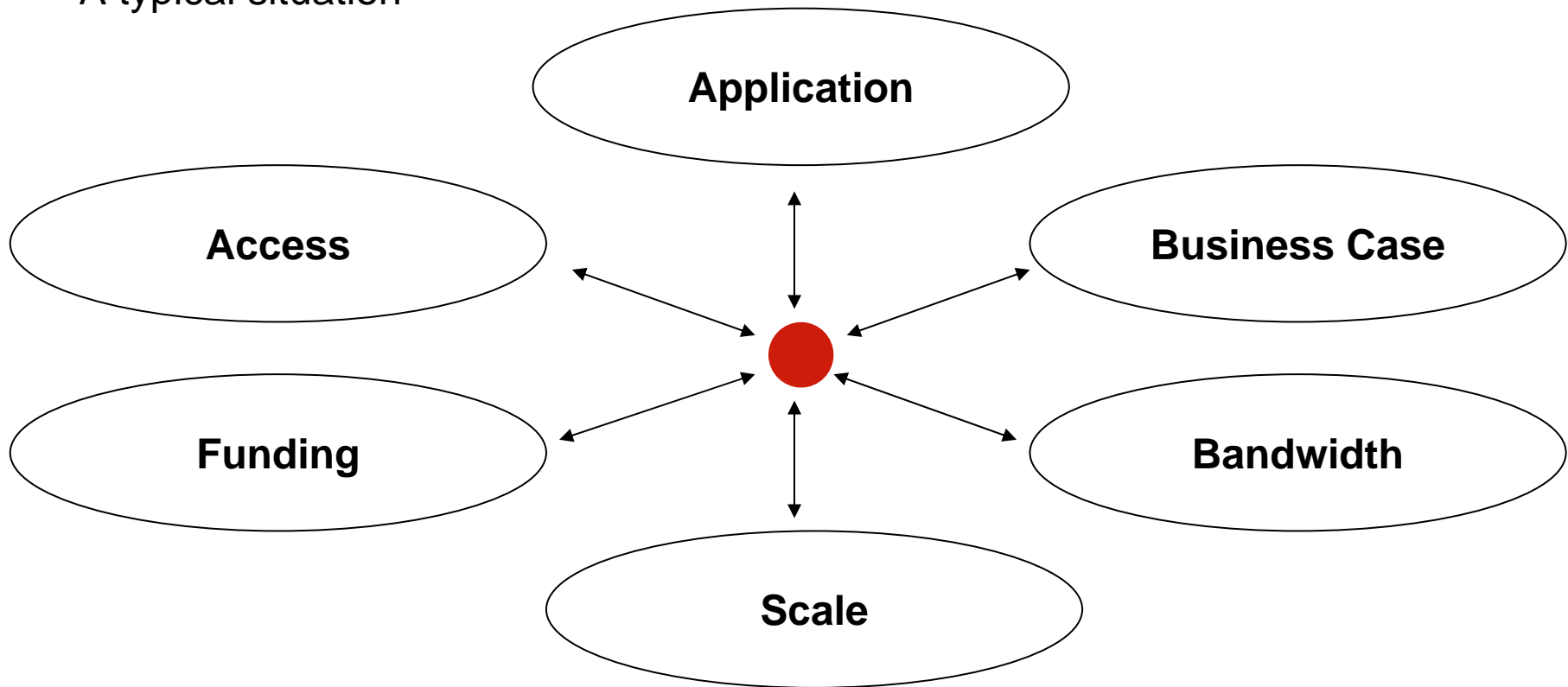

One test run

North America – Challenges

❑ Uptake when free

– No of sessions rises 5-6 times

– Bandwidth consumption can rise 10 times
  - Use and abuse
  - Need lots of uncontended bandwidth
  - Cellular alone will struggle to support a free service and give a good QoS

– Some users assign little real value
  - and yet take away bandwidth from those that do

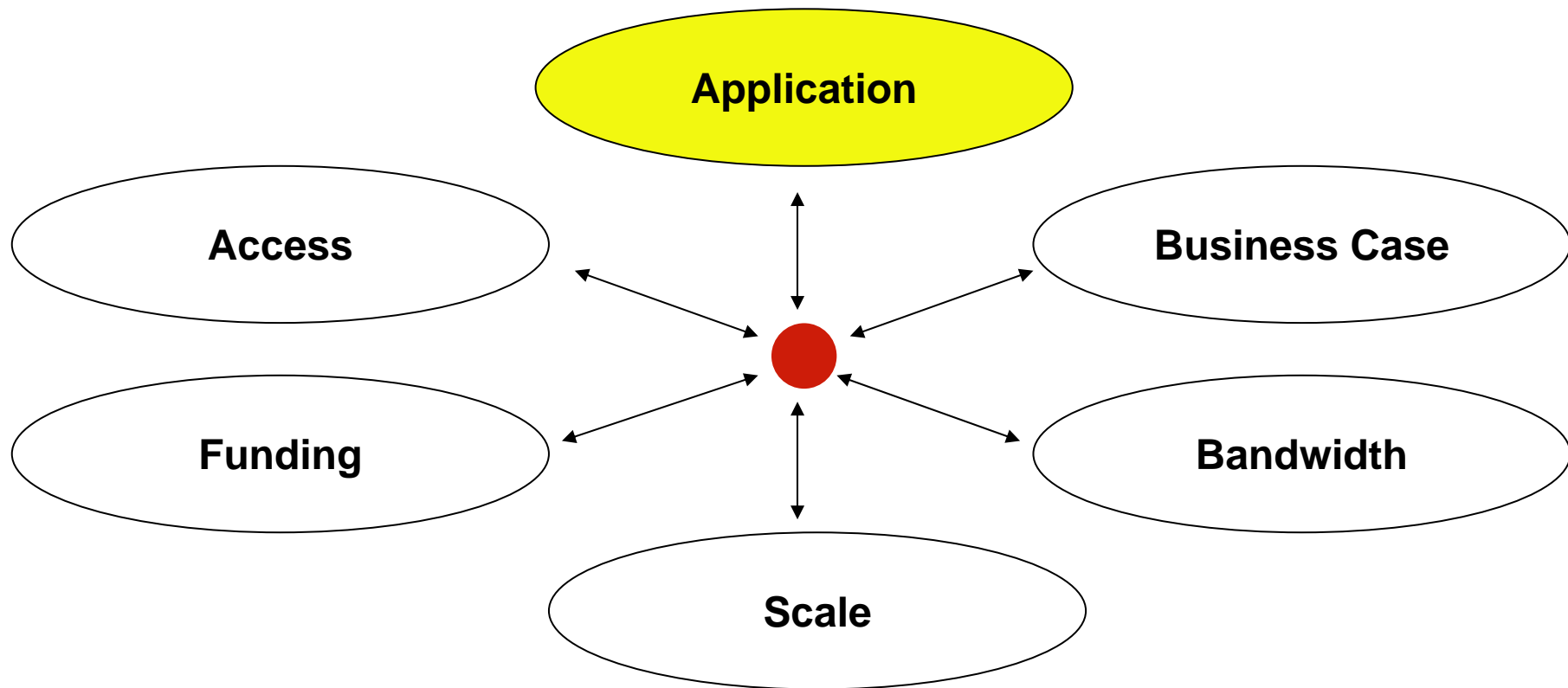– Those that value it say they are <u>willing to pay</u> to get better QoS

North America – Challenges – Operator A

A typical situation

```
              ┌──────────────┐
              │  Application  │
              └──────────────┘
                     ↕
  ┌──────────┐              ┌──────────────┐
  │  Access  │ ↖         ↗ │ Business Case │
  └──────────┘      ●      └──────────────┘
  ┌──────────┐ ↙         ↘ ┌──────────────┐
  │  Funding │              │  Bandwidth   │
  └──────────┘              └──────────────┘
                     ↕
              ┌──────────────┐
              │    Scale     │
              └──────────────┘
```

North America – Challenges – Operator A

Application

Access

Business Case

Funding

Bandwidth

Scale

North America – Challenges – Operator A

❑ Application

– Free passenger internet

  Why?

– Remote real-time ticketing

  Why?

– Safety & security

  Why?

– NOT train engine monitoring

  Why?

Nomad Digital

North America – Challenges - Operator A

BUT

❑ Access issues – 5.8GHz not possible

❑ Cellular won't provide sufficient bandwidth

❑ 4.9GHz has application limitations

❑ Capital funding is available, but opex is a killer

❑ Wary of advertising driven models

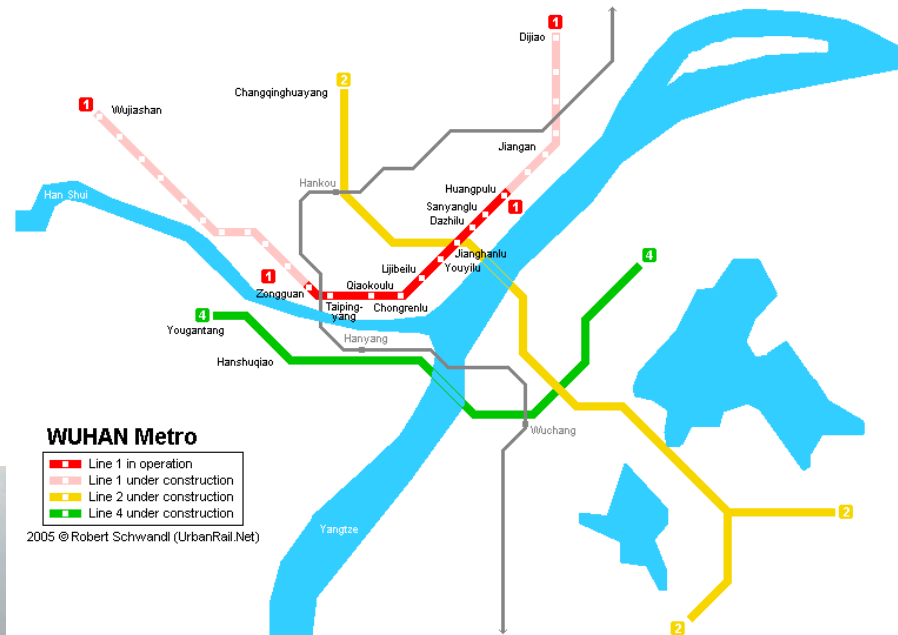❑ Wants control and a multi-platform system

REGIONAL VIEW – ASIA PACIFIC

Market developments – Asia Pac

- ❏ Market exploded in last 12 months
  - – China, Korea, Taiwan, Hong Kong, Japan, Australia, Singapore…
- ❏ RFPs everywhere
- ❏ Mostly metros
- ❏ CCTV driving it
  - – Stringent system requirements
- ❏ Advertising is growing

Market developments – Asia Pac

WUHAN Metro
Line 1 in operation
Line 1 under construction
Line 2 under construction
Line 4 under construction

REGIONAL VIEW – MIDDLE EAST

Market developments – Middle East

❑ New train lines planned

❑ Passenger WiFi

❑ "The Best"

– Trains

– Facilities

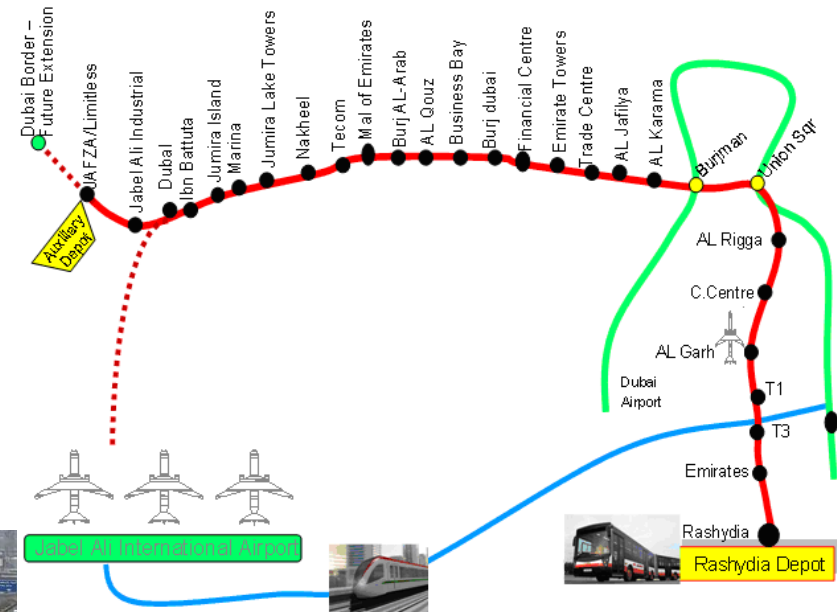– Systems

Market developments – Dubai

Phase1 = 69 trains

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Market developments – Dubai

Outline of Dubai Metro Project works

Phase1 = 75km of track

www.nomadrail.com

Market developments – Saudi Arabia

FROM EAST GOING TO WEST:
SAUDI LANDBRIDGE PROJECT

Saudi Railway is expanding to serve you better! Soon you can travel across the kingdom with the near completion of our expansion project

» Project Details
» Register Interest
» FAQ's

### LINKING HOLY CITIES TOGETHER:
MAKKAH - MADINAH RAIL LINK

The Proposed passenger rail network linking Makkah and Madinah to Western port city of Jeddah

» Project Details
» Register Interest
» FAQ's

SAUDI LANDBRIDGE PROJECT

- Connects Jeddah (Red Sea) to Dammam (Gulf)
- Over 1000 km of new railway
- Freight and high speed passenger service
- Land, Regulatory and other matters

Saudi LandBridge Project

KINGDOM OF SAUDI ARABIA

JUBAIL
DAMMAM
RIYADH
HUFUF
570 km
HARADH
JEDDAH
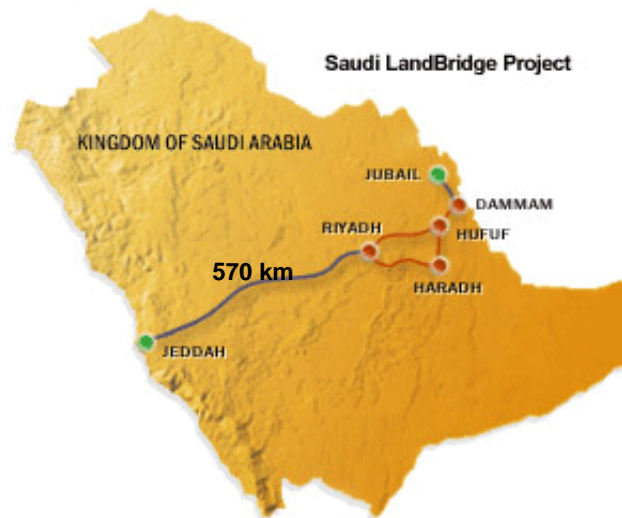
MAKKAH-MADINAH RAIL LINK

Passenger service to accommodate annual pilgrimage
Concessionaire responsible for design, financing, construction and operation

REGIONAL VIEW - EUROPE

Market developments - Europe

- ❏ Every major market showing activity
    - – Most still at trial stage
    - – SNCF trials - €19m budget! – holistic approach
    - – Very few have committed commercial rollouts – SJ, Thalys, DB
- ❏ New airport links being built – specifying WiFi
- ❏ RFPs due
- ❏ Many opting for trials of satellite solutions, but not all
    - – Suits several operators due to geography
    - – Some have rejected due to cost, intrusion or poor performance

Market developments – Europe - Norway

- ❑ First national contract award
- ❑ Phase 1 = 21 trains
  - – Long distance
  - – Regional
  - – Commuter
- ❑ Phase 2 = entire fleet (>260 sets)
- ❑ Scope
  - – Initially entertainment
  - – Now entertainment + passenger WiFi + op apps
- ❑ Cellular only + WiFi at hubs

RAIL ROUTES IN NORWAY

NSB

Market developments – Europe - Norway

Type 73

Type 73B

Type 5

Type 70

Type 69C

Type EL18 Locos

Type 93

Type 7

Market developments – Europe – SL Trial

❑ SL = Stockholm transit

  – Buses, Commuter Rail, Metro

❑ Green agenda – funding

❑ Innovation

❑ Bus trial – forerunner to integrated solution

❑ Applications

  – Commuter WiFi

  – Passenger Info: Travel Info, news, weather

  – Operational Apps: fleet mgt, tyre pressure, engine emissions

  – Live CCTV

Market developments – Europe – SL Trial

Market developments – Europe – SL Trial

Market developments – Europe – SL Trial

Market developments - UK

- ❑ High intent

- ❑ Passenger WiFi

- ❑ Franchise commitments, but not highest priority

- ❑ No significant new deals since last year's conference....yet

- ❑ OA starting on installed solns

- ❑ UK franchising system discourages investment

- ❑ ROSCOs still considering value

- ❑ Creative commercial deals required

THE FUTURE

The Future

❑ Passenger internet (WiFi) will still be a driving factor

- – Passengers will expect long-distance/intercity services to provide WiFi as standard (whether for-pay or for-free)

❑ Rail operators <u>will</u> use the platform for multiple applications

- – they will be expected to do so, to justify the initial invetsment
- – real-time cameras/security - use will grow (for ad hoc access)
- – operational applications
  - • will vary enormously from operator to operator
  - • but will be a no-brainer for rail operators who have already installed the system
  - • Will start with one small application and grow slowly as the benefts are seen within the orgainsation

❑ Bandwidth limitation will become a problem on some deployments

❑ Rail operators will start to appreciate long term running costs

❑ UK rail operators will continue to commit investments into such systems in franchise bids

❑ Creative commercial deals will be required in many cases BUT more funding will become available

THANK YOU!

PLEASE CONTACT US FOR FURTHER INFORMATION OR DISCUSSION OF ANY OF THE ISSUES COVERED IN THIS PRESENTATION

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