Hitrail: The Hermes VPN Network for Railway Services

In the Vanguard of Data Communications

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Why present this network to a FI conference?

• This presentation provides an overview of the development of the Hermes network as an example of virtual resources that support the interoperability of cross-border applications of the European railways.

• The character of the railway is changing. Market re-structuring is transforming the way that the railway stakeholders collaborate and compete with one another. The railway organisations are under greater pressure than ever to be both operationally and economically efficient, while observing safety regulations.

• The evolution of Hermes from a VPN to a service-oriented ICT utility infrastructure is expected to significantly enhance the value of existing railway business applications. Railway organisations would also benefit by tapping into virtual resources as utility building blocks for new innovative applications, creating a win-win for themselves and their customers in value flow, value distribution and value transaction.
The Present (2011) Mission and Vision

- **MISSION STATEMENT**
  - To provide and manage a secure international private IP VPN service for its Shareholders and Clients for Rail related applications
  - To deliver the services required by International Railway Applications such as passenger reservations, train monitoring and freight operations
  - To provide such a service in a fair equitable way at competitive price
  - To develop and support the higher level protocols for network access known as HOSA protocols.

- **VISION**
  - To become the largest supplier of International, secure, stable, low-risk and cost-competitive private IP VPN services to support the existing and emerging Railway Community at a required level of quality and reliability.

**Information Technology Services for the European Railways**

HIT Rail bv, a private Dutch company owned by 12 European Railways Undertakings (RUs) and Infrastructure Managers (IMs), is responsible for managing international private Data Communications infrastructure on behalf of its shareholders and customers.
What is it we do?

• Connect railways
• For what? International pan-european services
  – Freight
  – Passenger
  – All Business to Business
• To do what?
  – Consign freight
  – Manage trains
  – Manage wagons
  – Sell reservations and tickets
The Prehistory (1978-1990): Pregnancy

- **Hermes took shape in 1978** when six railways (BR, DB, FS, SBB, SNCB and SNCF) agreed, under the patronage of the UIC (International Union of Railways).
- They commissioned the installation of the “Hermes” network. From the beginning the decision has been made to use international standards where possible. This lead to **adoption of CCITT X.25** as the network protocol.
- In the absence of standards for the higher-level, the UIC **special protocols**, a common set of Hermes messages, were defined.
The First Years (1990-1994): Childhood

- The new Hermes Plus network used more up-to-date X.25 nodes and managed the migration of the railways systems to the new fully meshed network.
- Professional network management was provided from the Network Management Centre in Nottingham.
- The inter-application standards (UIC Protocols) developed to communicate over the initial network were still in effect.
The Migration and Growth (1999-2006): Maturity

- Hitrail has prospered and successfully expanding into the former Eastern European territory.
- During the 90’s railways experimented with Internet Protocol (IP) and by 1999 all the railways agreed to change applications and network protocols to MQ and FTP based on IP.
- As a consequence, the Community of Railways involved in Hitrail developed a successful Internet based architecture known as Hermes Open Systems Architecture (HOSA).
- The conversion to the new protocols took in all 7 years
The Migration and Growth (1999-2006): Maturity

- To reduce costs inherent to ownership of network nodes and leasing lines, Hitrail took the strategic decision to outsource the network provisioning.
- A new Hermes IP based VPN network was implemented in 2002 using AT&T infrastructure, requiring a simultaneous migration of the railways to the new applications protocol and network based on HOSA standard.
- From 2004 new technologies (e.g.: MPLS), new applications (e.g.: Europtirails) and new customers impacted the network and required a more solid and stable platform.
- In 2006 a second generation Hermes IP VPN based on BT MPLS infrastructure has been implemented to support new applications and services.

Amsterdam 5th May 2010

20th Anniversary of Hitrail
The Challenging Years (2006-Today): Thirties

- In the last years, the network has consolidated and today there are **46 sites** deployed in **23 countries** attending **12 shareholders and 28 customers**.
- Almost all the sites are connected via **2Mbits** and the data sent across Hermes VPN was rounded **4 Terabytes** in 2009.
- Hitrail is well founded with **assets** for a value of **€3.8 million**, yearly **turnover of €1 million** and positive **net result of €100 thousand** per year.
Typical railway applications how they use the network

- **Reservation and availability**
  - High volume passenger application providing seats tickets and prices for international passenger journeys
- **Interchange**
  - Handover of freight trains from one operator to another
- **Train running information**
  - Reporting of train running and delays
- **Freight Consignment Notes**
  - International freight waybill following the freight wagon’s journey
The Future

• Hitrail has always led on standards adoption
  – It used early X25
  – It adopted IP and Open Standards early
  – It therefore wishes to be an early adopter for
    • Cloud computing
    • IP v6
    • Newer lower cost networking
  – However it has 3 classes of customer in the new internet
    • Traditional large railways needing high speed secure virtual private network cooperating
    • Lost cost smaller railways for whom price and connectivity are key and who need to interconnect easily
    • Interconnections with other transport modes via gateway(s)
Value added

• Connectivity is the key to virtual resources
  – Connection to any player – operator, infrastructure provider, maintainer
  – Connectivity to applications
  – Connectivity to databases
  – Ability to connect and exchange data in parallel to offer end to end service
• Secure connection is important
• Performs with the new cloud technology to give guaranteed service
• Problem resolution help – ability to diagnose cause of lack of connection
• Service recovery – automatic re-routing of service and restart recovery
• Link network technology to application process (ip level statistics) -
• Services better aligned with the process they support – SOA technology solutions
• External gateway to other modes…air bus sea
Current Technology

- MPLS services with no need for class of service as yet as excludes general internet traffic
- Dedicated ip per application to assist in diagnosing application level activity
- Internet back up to vpn
- Automatic fallback and recovery
- Ipsec tunnels for small users via Internet only
- Guaranteed service levels of < 100 ms typically 20-30 ms
Interoperability Legislation

• The EU has been passing considerable legislation over the past 10 years
• Its objectives are to achieve true interoperability across the rail network
• Mandates
  – Messages
  – Some databases
  – Electronic trading between railway actors
    • Rail operators
    • Rail Infrastructure managers
    • Rail vehicle owners/keepers
    • Maintenance organisations
• Impact is a huge increase in potential network traffic over the next 5-7 years and all business to business trading if fully adopted
• EU intends for intra-country traffic as well and international traffic
An overview of the Interoperability ‘Virtual Resources’
New value creation needed

• Interoperability means moving from utility model connecting railways to an enabling model permitting different connection possibilities
• Collaborative support with some central service providers
• Service oriented model rather than simple ip to ip
• Web services SOA support to move from message exchange to transactions and some need for conversational support, synchronisation across European journeys and with third party sales gateways
• Questions?
  – Private cloud & security
  – Future services model
  – Future pricing models

• Process model
  – Hitrail sees the key opportunity to match services with users processes in the sales service cycles
What about the future?

• The cloud we are at the same time
  – A community cloud (for railways)
  – A hybrid cloud (with 3rd parties)
  – A private cloud (for guaranteed service to key players)
  – So how will this work?

• The service classes - We need to provide
  – Service guarantees between applications
  – Service diagnostics and repairs
  – Middleware to link services to client needs
  – Virtual messaging (end point is dictated by virtual pointers e.g. wagon database and train movement database)

• The changing internet
  – Ip v6 migration
  – IT outsourcing means we connect to a virtual organisations and maybe virtual applications in the future
  – Real customer wants to see a quality service which easy to use and self monitoring

• The mobile cloud
  – Will need to cater for small mobile efficient users
The Future needs and why – Value Creation

• Cooperation and Competition
  – Opening the market has introduced lots of new players
  – Rail v other modes need single cooperative product
  – Means business to business efficient messaging
  – Competition means each wants to ensure offers are published and available with their own ‘customers’
  – Trust because it a ‘community’ network

• Interoperability and EU legislation
  – Means xml and move from trusted file transfers to real time transactions

• Impact on Hermes
  – We have the opportunity to knit this varied community together
  – We need to interfaces to other modes
  – Complex – we will supply the middleware – but also need to manage the risks
Beyond 2013 analysis and Cloud Technology

- **Private Cloud** will be the basis for our major clients
- We plan to implement **low cost cloud solutions** for small customers
- We believe **Web Services** will be mature and using new secure standards and we will be in that market for the railways
- **Cloud Computing** technologies and industry experiences are expected to evolve to 4 classes of services beyond 2015
  - Class 1 - Generic Business Services
  - Class 2 - End-to-End Management Services
  - Class 3 - Information Exchange and Resource Virtualisation Services
  - Class 4 - System Services

- How will we be able to use the Future Internet with its virtual resources to meet this challenge?
  - Virtual application points
  - Secure
  - Self repairing
  - Service based but who will guarantee what?
  - What will happen to prices?
Hitrail Event at European Parliament

Launch of new strategy will take place

On 6\textsuperscript{th} December 2011

At Brussels

In the European Parliament Building

Between 0930 and 1700

It will describe the future requirements to the Rail group of MEPs and present HitRail’s strategy for addressing those requirements

See the address \url{www.hitrail.com/rcevent} to register interest
The Future of Clouds and Hitrail

Hermes Private Cloud & HOSA Plus

Draft Proposal for HPC & HOSA+ Migration

Version 1.0
Thank you very much – any questions?