

Terena Networking Conference 2003



JANET Network Access
& Last Mile Technologies

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What are Network Access Technologies?



Often referred to as:

- Local Loop.
- Last Mile.
- First Mile.

Defined as the **network** between you (end site) and the local exchange/hub/base station.

Types of technology

- xDSL, Satellite, Fixed Wireless, Cable Modem, IP over Power, Fibre to the Home/Building.

Why Network Access?



- **Changes in Teaching & Learning environments**
 - Move to the home & workplace learning.
 - More distance learning.
 - Emergence of “virtual and managed learning environment service providers – e.g. Learndirect.
- **Changes in local loop provision**
 - Unbundling of the local loop.
 - Provision of a variety of competitive broadband type services.

Result:

- Increased demand for local loop “broadband” access to
 - Main campuses and other academic sites via JANET.
 - Learning material and Virtual & Managed learning environments.

JANET Network Access



Two complementary areas

– **Network Access Technologies**

- Direct connection to JANET.
- Access to JANET via the commercial internet.

– **Location Independent Networking**

- Mechanisms to make network access simpler for people who move around and between campuses.
- This area is not access technology specific and would involve both wired and wireless access.

More details about JANET Network Access are available at
http://www.ja.net/development/network_access/index.html

ADSL



Asymmetrical Digital Subscriber Line (ADSL)

- Part of xDSL family.
- Asymmetrical – low uplink & high downlink rates
- Segments frequencies over existing copper wires to carry voice and data simultaneously.



UK Strengths

- Dedicated “Always on” connection.
- Standards based.
- Flexible product options.
- Competitively Priced.
- Assumes high networking knowledge.

UK Weaknesses

- Limited range (up to 5.5 Km).
- Limited access to 66% of UK pop.
- Dominant Supplier.
- Contended service.
- Increased hacking risk as “always on”.

JANET ADSL Trial



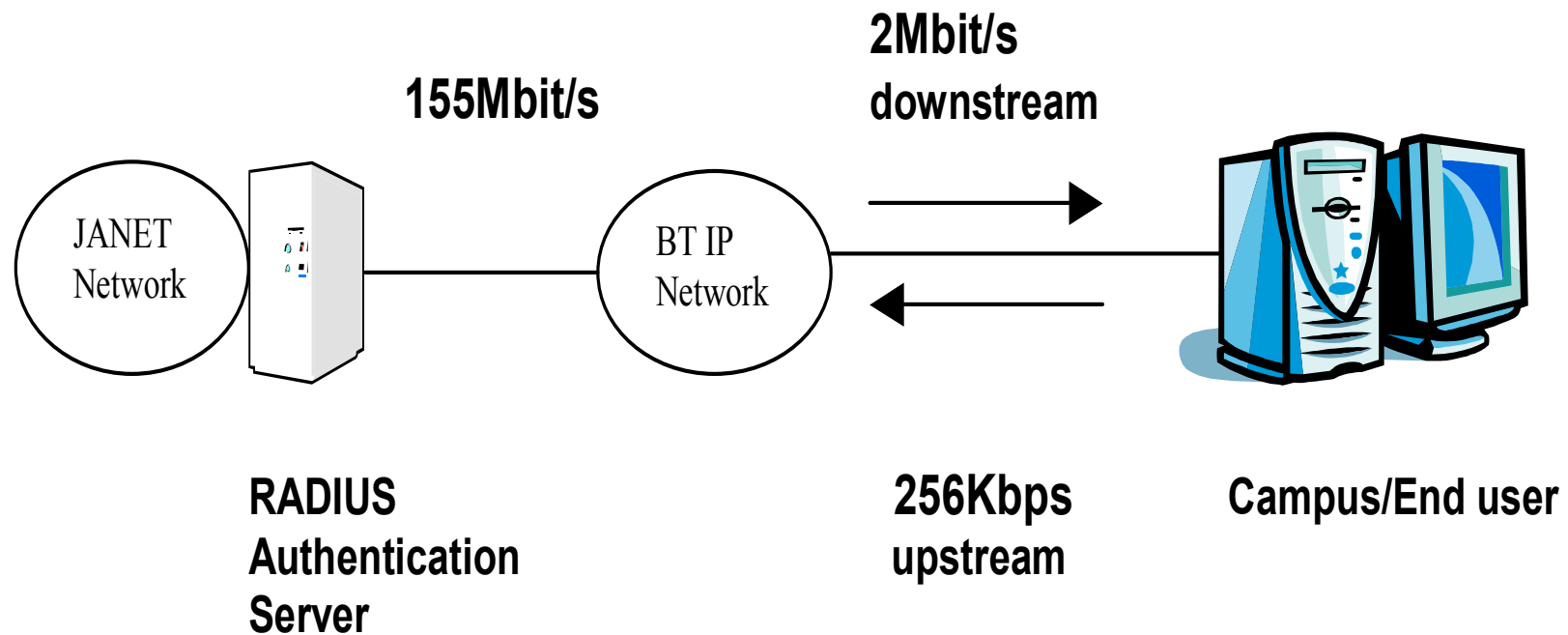
- **Trial objectives**

- Feasibility assessment of a JANET ADSL service.
- Investigate the service delivery / support implications.
- Identify ADSL connectivity performance issues.

- **Background**

- The six-month trial began in May 2002.
- UKERNA purchased a direct connection between JANET and British Telecom.
- 23 off campus learning centres have ADSL connectivity directly to JANET and the Internet thereafter.

JANET ADSL Trial Network Topology



JANET ADSL Trial

Key points



- **Limitations noted in BT approved ADSL routers.**
- **“Wires Only” with local support recommended.**
 - An easier provisioning process.
 - End site must purchase and configure own router.
- **Wireless 802.11b & ADSL**
 - works well.
- **VPN over ADSL**
 - difficult to configure.
- **The trial service will close at the end of May 2003.**
 - Competitively priced products meet the needs of the JANET community, therefore the UKERNA trial service will not migrate to a full service.



Two-way Satellite



- **Features**

- Two-way satellite connectivity to the Internet.
- Asymmetric - different download and upload speeds.

- **Strengths**

- 100% coverage across the UK.
- Flexible range of product options.

- **Weaknesses**

- Expensive (resulting in limited bandwidth).
- Latency(>750ms round trip time) not for real time apps.
- Network contention.
- Data throughput limits with some services.
- May not be suitable in extreme weather conditions.



JISC / UKERNA

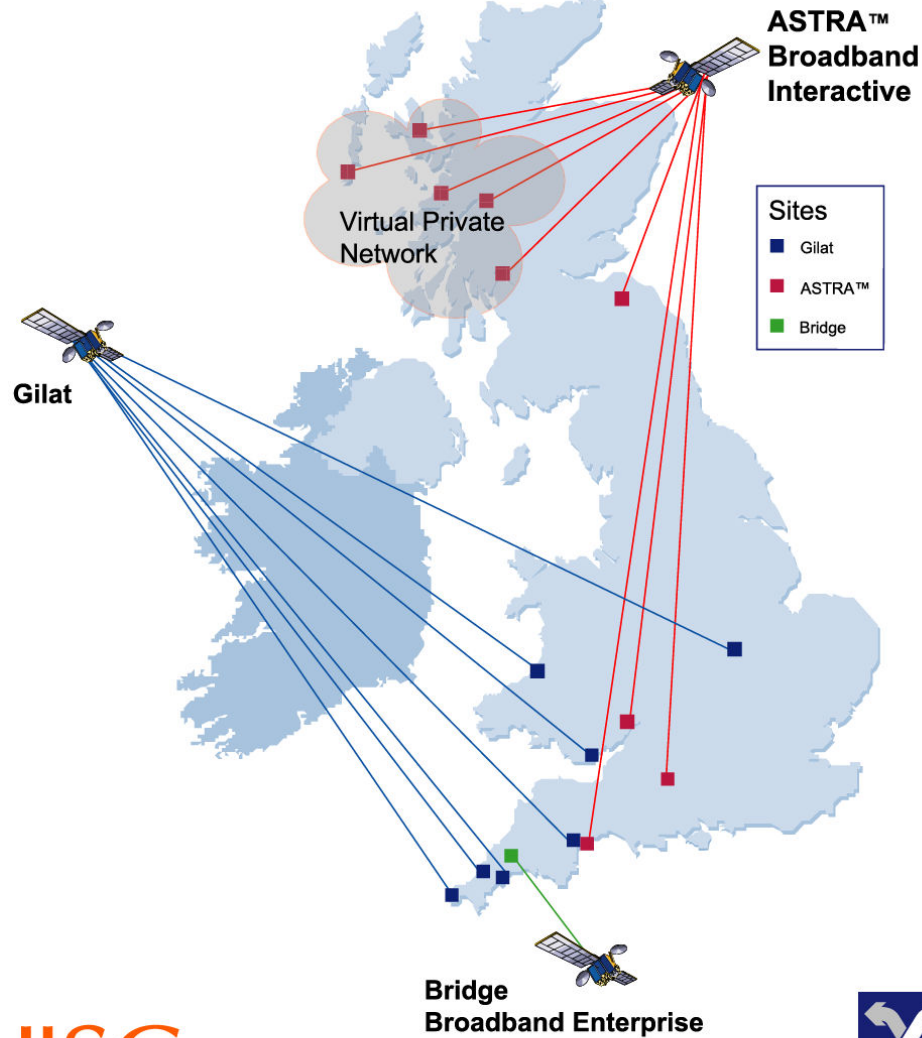
Two-way Satellite Trial



- 12-month Satellite Trial
- Connecting remote and rural areas across the UK.
- Three satellite platforms being trialled
 - **SES ASTRA - BroadBand Interactive** - for supporting nine small LANs.
 - **SATLYNX - Gilat** - for supporting seven small user groups and individuals.
 - **Hughes Network Systems Europe – Bridge BroadBand Enterprise Server** - Connecting one large campus that has up to 150 PCs.



JISC Two-way Broadband Satellite Trial - geographical coverage



Trial Activities

- UKERNA to trial Content Delivery and H323 videoconferencing over BBI
- Sourhope to trial Voice Over IP over BBI
- UHI trialling a 5 site VPN over BBI
- Both BBI and Gilat systems deployed in rural & remote areas

21 May 2003 **JISC**

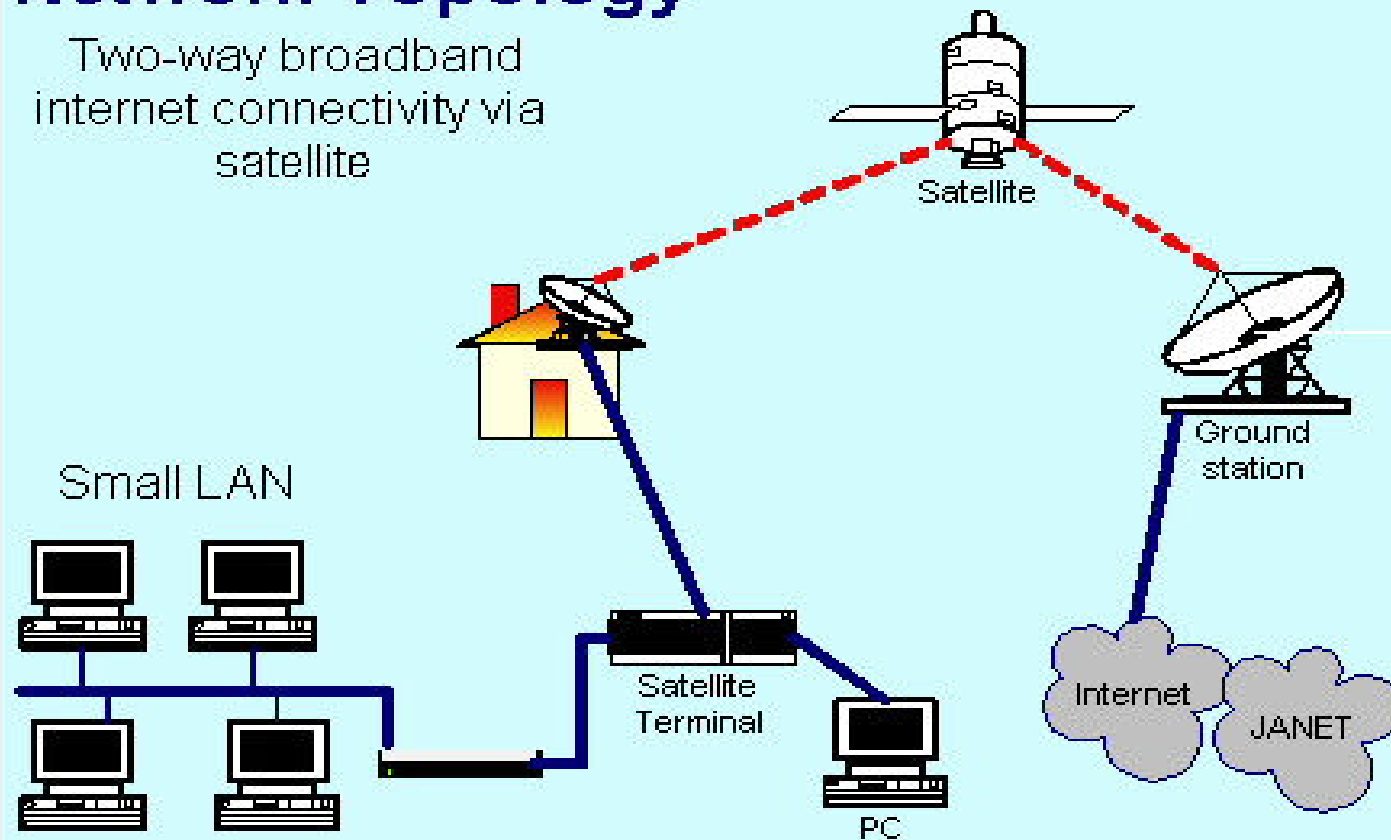


JISC / UKERNA Satellite Trial



Network Topology

Two-way broadband internet connectivity via satellite



BBI Ground station at
Betzdorf,
Luxembourg

Gilat Ground station at
Backnang,
Germany



Satellite Trial

BBI and Gilat technical specifications



Terminal Type	Gilat 180	ASTRA BBI
Standard	Proprietary	EMS 2000
Transmit Power	1 Watt	1 Watt
Transmission Freq	Ku Band	Ka Band
Maximum Transmit Bandwidth	150 Kbits/s	384 Kbits/s
Receive Frequency	Ku Band	Ku Band
Maximum Receive Bandwidth	500 Kbits/s	2048 Kbits/s
Antennae Size	65cm x 90 cm	75 cm
Max No of PCs	4 PCs	13 PCs
Applications Supported	Email Web FTP	Email Web FTP, VPN PN Citrix, IPsec

Two-way satellite trial

– Current status (April 2003)



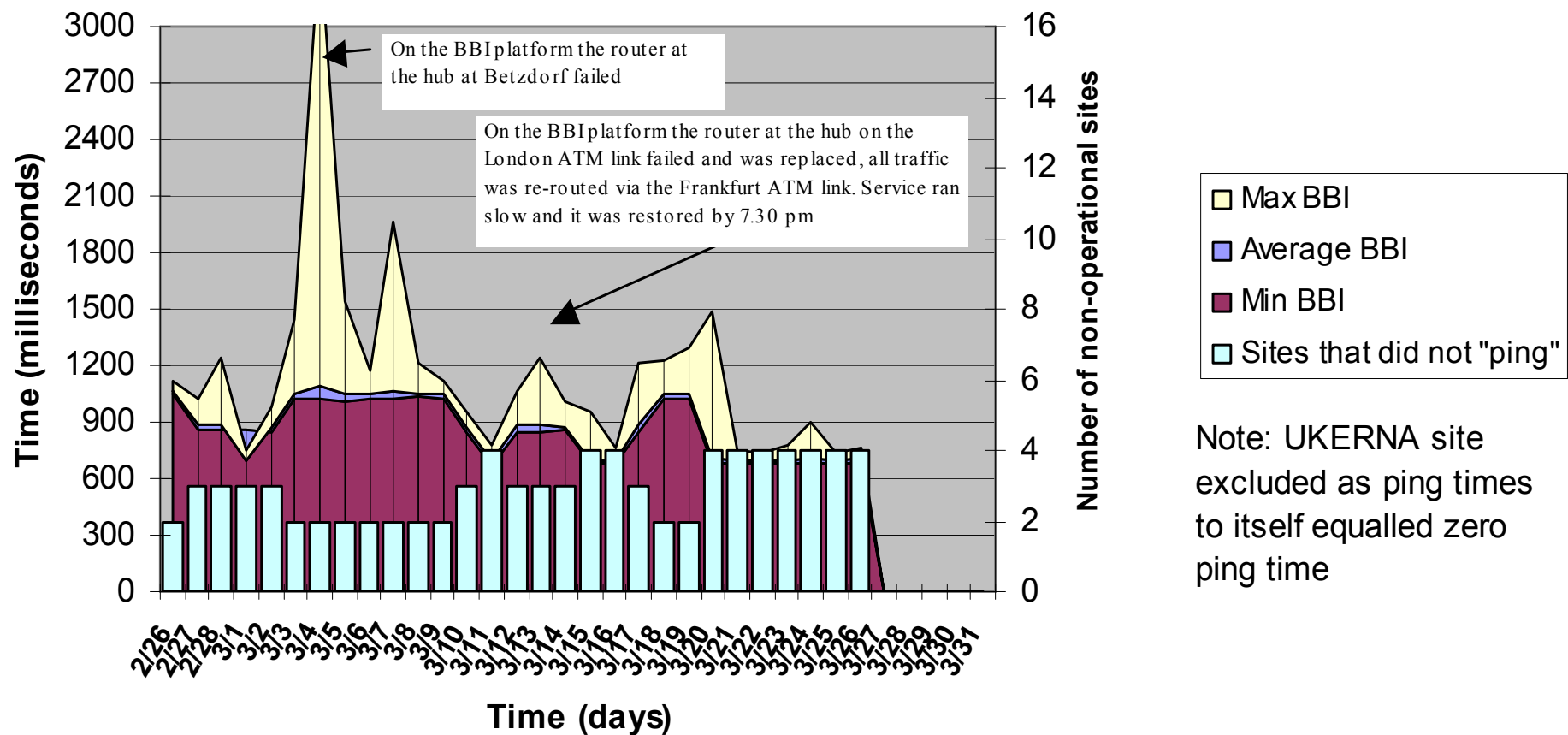
- **BBI and Gilat satellite platforms**
 - Network performance statistics for BBI and Gilat satellite platforms are updated each month, these are available at http://www.ja.net/development/network_access/satellite/activity1/results.html
- **Cornwall College – Duchy Campus**
 - A Bridge Broadband package utilising Hughes Network Systems Europe technology to support up to 150 PCs has been installed on Friday 9th May 2003.



BBI satellite results



A Graph showing the Round Trip Ping Times for 8 BBI sites



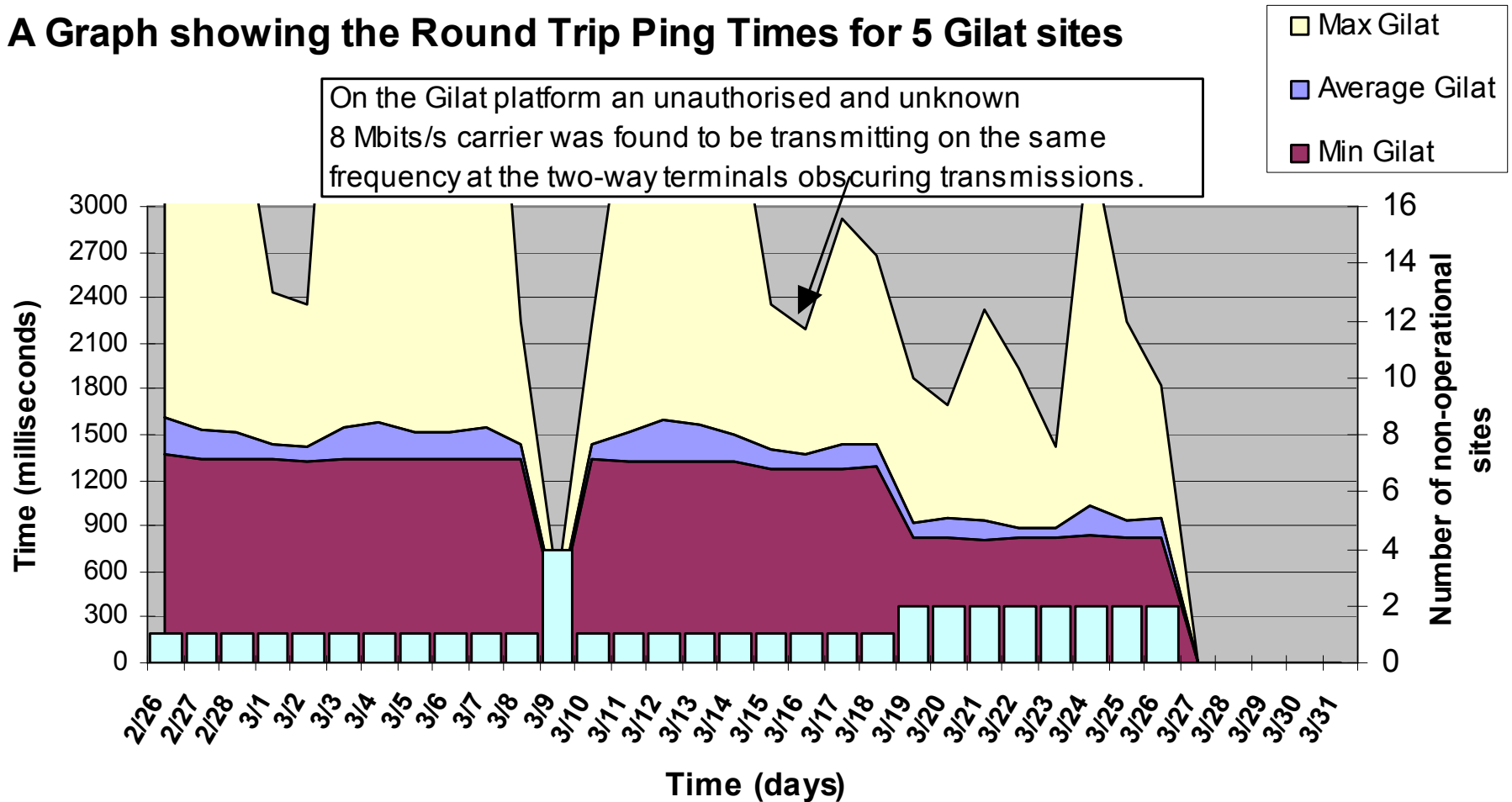
Note: UKERNA site excluded as ping times to itself equalled zero ping time



Gilat satellite results



A Graph showing the Round Trip Ping Times for 5 Gilat sites



UKERNA Wireless Access



- **Wireless Networks Survey**
 - UK Survey of Fixed and Mobile wireless activities in the academic community completed.
http://www.ja.net/development/network_access/wireless/uk_activities/
- **JANET Wireless Advisory Group.**
 - First meeting scheduled for the end of May 2003. The aim of the group is to recommend suitable wireless technologies to trial, and produce a strategic framework for these trials to take place.
http://www.ja.net/development/network_access/wireless/wag/tor.html
- **Terena Mobility Task Force.**
 - Active participation in task force activities
<http://www.terena.nl/tech/task-forces/tf-mobility/>

Other Network Access Activities



Tracking and where appropriate, a feasibility study of

- IP over Power
- Cable Modem
- Fibre to the Home / Building
- Mesh Radio
- Mobile 3G / UMTS

Network Access Users



- **Current Focus**

- Connecting scattered pieces of campus
 - off campus learning centres.
 - Student residences.

- **Manageable & Scalable**

- Works well as UKERNA liaise with its JANET Connected Organisations that provide localised support.

- **Futures**

- Individual Learners (demand increasing here)
 - Staff
 - Students

- **Issues**

- JANET Acceptable Use Policy & T&Cs...
- Content Filtering issues
- AAA & Security issues
- Payment of Services
- Technical Support issues – where is the demarcation line?

Working with European NRENs



- **NREN Collaboration**

- Where NRENs have already deployed similar trial activities, many have documented lessons learned online, technical experts should be encouraged to
 - Actively collaborate with other NRENs to discuss and resolve technical issues
 - Exchange results / documentation on proposed plans and results for comment
- The end result is a richer, value added and value for money approach to NREN technical developments.

- **Examples**

- Terena Task Forces (e.g. Mobility), IP Telephony cookbook, TF Next Generation Networking, Internet2, 6NET, SEQUIN...

Summary



- **UK Network Access**
 - Many network access technologies available.
 - Prices becoming more competitive.
 - No single technology solution for all.
 - A mix of technologies needed to meet local needs.
- **Many issues to consider when determining network access technology choice(s)**
 - User and their needs, Security, AAA, Bandwidth, Contention, Latency, & Cost.
- **Location Independent Networking**
 - A necessity to exploit Network Access Technologies.
- **NRENs**
 - NREN collaboration is an invaluable resource that should not be underestimated in the development of technical projects.

Futures



- **AAA issues**
 - Need resolving to enable the support of a variety of network access technologies and secure access to applications and content.
- **Location Independent Networking**
 - Enabling transparent access from a “guest” institution to either (1) Internet or (2) secure “home” institution access.
- **Bundled network access solutions**
 - Combined NICs supporting both wired and wireless (DSL / Cable Modem / 802.11b / GPRS/ UMTS) - auto detect to select based on user profile.
- **Rural broadband connectivity**
 - Network access must be developed to offer similarly priced service packages for both rural and urban areas.
- **Network Access solutions for individual users**
 - Need to consider and overcome support issues for individual learners needs.

Thank you & Questions



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