

**Periodic Progress Report 8**  
**Period: 7.2004 - 10.2004**

**IST-2001-37580**

**Silk Project Operations Networking and GEANT Extension**

**SPONGE**

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## 1 OVERVIEW

The hardware problems with many of the earth-stations have been largely resolved. Where higher speeds were needed, above 1 Mps, we have replaced the defective equipment with a different design. We are not doing a wholesale replacement until we have decided on our communications policy following July 2005. No NREN is suffering from this decision, since the fault only shows up at a level higher than they were currently scheduled to run.

We made a further site visit to Kabul, and have shipped the equipment to that site, and local site preparation completed. The visit was also in relation to a substantial grant to provide infrastructure at universities and scientific institutes in Kabul and connect these sites to the Silk NOC. An overview of budget requirements will be presented to the NATO Science Committee in October. There were some delays in obtaining visas for the installation team, so that now the site will become operational only during the first half of October. The NATO Science Committee took the important step of extending the Silk Highway Project for another two years by awarding it a further 800K Euros. The award was accompanied by a requirement to plan a phase-out of NATO funding over the period of the grant. A plan to achieve the reduction in an orderly manner was accepted by the Silk Board at its September meeting in Dushanbe, Tajikistan. The proposals will now be presented to the NATO Panel and the Science Board in October. This Silk Board was the last at which the Walter Kaffenberger, who has been the NATO Programme Director, was present; he left NATO as of the end of September.

Since the extension of the Silk Highway Project has been agreed, we need to determine the most cost-effective communications mechanisms during the extension period. Early studies indicate that fibre is still more expensive than satellite connectivity in these parts of the world – though the gap in costs is narrowing rapidly in the Caucasus. There are offers to carry much of the Silk traffic via the Russian NREN at a favourable cost inside Russia; costs to the border of the partner countries, and political sensitivities, may be severe stumbling blocks to the adoption of such solutions. We have also been soliciting alternate satellite options. One result is an offer in which the traffic costs for the Caucasus is only half the current Eurasiasat costs; another is 75% the cost of the Eurasiasat option, and covers the whole region. Both of these may involve some capital costs. We are now starting to negotiate seriously to determine whether the Eurasiasat offer can be improved, and the trade-off between cheaper bandwidth costs compared to higher capital expenditure.

The first phase of the IPv6/satellite work has been largely completed. This is the phase in which special IPv6/DVB cards were installed in five earth stations. It culminated in a largely successful demonstration of multi-way IPv6 multimedia conferencing, using the technology developed at IABG for the cards, and 6NET for video-conferencing. Because it also showed that these particular cards use inefficient modulation, we expect to use them only to complete some functional testing. The Silk sites have expressed interest in continuing to obtain IPv6 experience, and on-going IPv6 activity, using tunnelled IPv6/IPv4 will be continued until the end of the current phase of the project – July 2005. We are planning to deal with the shortcomings shown in our current early tests, and demonstrate live, native IPv6 multi-way conferencing at the IPv6 booth at IST2004 in the Hague.

Discussions with the University of Central Asia have re-started, but it is not clear what will be the result. There are some thoughts of their joining a regional network based on Kazakhstan. Discussions with the World Bank have started again.

This has been a very fruitful one re education and training. There have been workshops on wireless, distance learning and IPv6. All were given with Russian consecutive translation. All had considerable hands-on experience.

From the dissemination viewpoint, this was a very successful quarter. At the APAN meeting in Cairns Australia, Kirstein gave a keynote talk on the European IPv6 activity, another one on recent Silk progress at the Coordinating Committee for Intercontinental Research Networking there, and one specifically on the IPv6 work at the Australian IPv6 Forum also. A talk on this IPv6 activity was given at the London Communications seminar, at the IPv6 Silk Workshop in Hamburg and at the ESA IPv6/satellite Seminar in the Hague in September. Finally talks were given on this work by IABG at the IPv6 Workshop in Hamburg,, the ESA seminar on IPv6/satellite, and the IPv6 Cluster meeting in Manchester. A paper on Silk was submitted and accepted by the organisation of the IPSI Conference (October, Venice).

No Deliverables were produced during the quarter. We should have produced D9 on operational experience during the previous quarter. However there were significant changes in configurations during the current quarter, so that we decided to delay the deliverable by one month to cover the current quarter instead.

## **2 TECHNICAL ACHIEVEMENT**

### **2.1 WP 1 - Administration and Management**

The project has three tasks in the administration of the Silk Project and of the Sponge Project itself, namely:

- A1.1 SPONGE Project Management
- A1.2 Silk Project Management
- A1.3 Relationships with Funders.

#### **2.1.1 Sponge Project Management**

There was a SPONGE meeting in Dushanbe, but there is little to report.

#### **2.1.2 Silk Project Management – Silk-I**

The Silk project was scheduled to end in July 2005; this initial project is hereby called Silk-I. This section is concerned with the Silk-I Project management. The 7<sup>th</sup> meeting of the Silk Board (SB7), was chaired by Prof Kirstein and held in Dushanbe, Tajikistan – September 27-29, 2004. The minutes are being written, and will be provided to the Project Officer, and put up in English and Russian on the Web Site.

The problems with the Block Up Converter (BUC) have been partially resolved. Most with problems have been repaired, though some further ones have demonstrated signs of malfunction. We now regard that this will be an ongoing problem. We have purchased four BUCs from Advantec, which are more powerful and have no problem; these have been installed in Bishkek and Kabul, with two more in Tashkent and a Hamburg spare. We had proposed to replace all the BUCs with Advantec ones, but have decided against this for now. First they seem to work alright provided the load is kept below 1 Mbps in the SCPC channels; second, we do not yet know what communications infrastructure will be used after July 2005.

The Kabul earth station has been delayed due to technical problems in Kabul. It has been shipped, and is to be installed in the beginning of October. The regulatory problem in Armenia is now supposed to be resolved in October – but we have heard this before!

The next three Silk Board meetings are scheduled for Istanbul, Turkey, (SB8, January 16-18,2005), Yerevan, Armenia (SB9, June 2005) and Bishkek, Kyrgyz Republic or Tashkent, Uzbekistan (SB10, October, 2005).

ARENA has continued to be particularly helpful in the translation of material into Russian; GRENA has continued its activity on discussions of successors to the Silk Project, performance measurements and the provision of infrastructure service.

The Silk equipment has now to be maintained. This has led to a new problem appearing. Some governments are charging a high duty, up to 20% of the purchase price, every time equipment is exchanged for maintenance. We are trying to resolve the problems this policy causes.

#### **2.1.3 Silk-II Preparation**

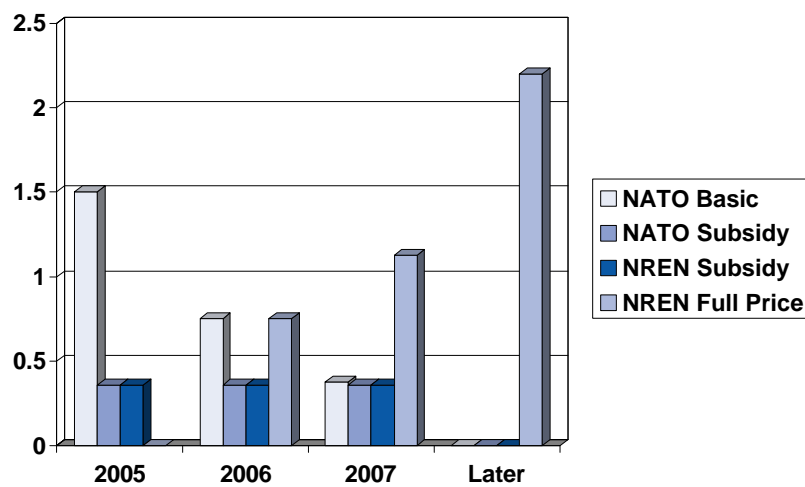
The Science Committee has provided a further 800 KE to continue the Silk Project for a further 2 years; this continuation we call Silk-II. During this period we are supposed to move the project towards a self-sustaining basis. There will be some more NATO funds for Afghanistan; most of this will be for NREN development there, but some for Afghan bandwidth,

In preparation for this, there have been two sets of activity. The first is to start moving towards requiring contributions for communications from the Silk NRENS; the second is to investigate the most economic form of communications during the extension period. In addition to the above, the current activities like management and training should be continued. As far as management is concerned, the SPONGE project will terminate during the first half of 2005; we will discuss with the European Commission whether some sort of follow-on activity could be envisaged. For training, we have started further discussion with the Internet Society (ISOC) about further support.

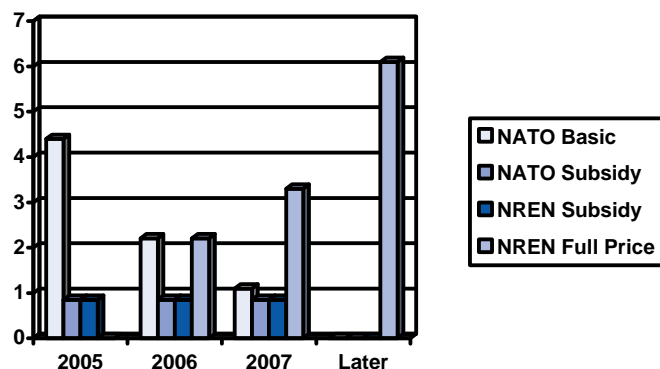
Prof Kirstein has held discussions with both the NATO Panel and the Assistant Secretary General (ASG) on the current status of Silk, and how the Silk-II funds will be used. He will provide a paper for, and will address twice, the next Science Committee meeting at the end of October.

**2.1.4 Co-funding from the NRENs**

We have decided to start requiring a contribution from the Partner countries already from the beginning of 2005. We could, with the bandwidth we are now purchasing from December 1, provide around 1860/620 Kbps on the receive and transmit directions. We have decided instead to provide only a basic amount of 1500/500 Kbps, and then to subsidise another 720/240 Kbps at 50%. We could have provided the free bandwidth for 16 months. Instead we have agreed to provide the basic 1500/500 Kbps and the subsidised bandwidth of up to 720/240 Kbps for two years. We will reduce to 50% the provision of basic bandwidth during 2006, and reduce this to 25% during the first half of 2007. The amount of subsidised bandwidth remains constant during the same period. The impact of this on the partners is shown in Figs 1 and 2. Here we are assuming the Euriasat cost remain at their current level. If the costs per Mbps is reduced, it does not change the shape Fig. 1, just the amount of bandwidth provided. The costs in Fig. 2 will be unaltered.



**Figure 1 Provision of received bandwidth to the NRENs in Mbps**



**Figure 2 Cost to each NREN in K\$/month of the four components of communications**

Most Silk Board members indicated that they hoped they could persuade various bodies to come up with the requisite finance, though some countries may have to restrict themselves to the minimum provided by NATO.

### 2.1.5 Choice of Communications for Silk-II

We have compared the costs of fibre and satellite. There have even been offers of substantial subsidies for the use of the Russian NREN in the provision of terrestrial communications. Even with that offer, all the indications are that fibre will continue to be more expensive than satellite during the period of Silk-II, both in the Caucasus and Central Asia. For this reason the decision has been made that satellites will continue to be used. Eventually fibre will become cheaper than satellite; then the political question will have to be addressed.

Eurasiasat's first indications were that their costs during Silk-II would be the same as in Silk-I. We also have had offers from other satellite providers. One has offered capacity in the Caucasus at 50% of Eurasiasat's; that satellite cannot see Central Asia. Another has offered a satellite that can see all the Silk countries, which would cost 75% of the Eurasiasat one; both of these solutions would require some capital expenditure to modify the earth stations. We are discussing with all the potential providers what their best offers might be – bearing in mind the political implications of providing this capacity. These will be evaluated and decisions reached during the next two quarters on both which provision would provide the best value, and what contractual conditions must be envisaged. There is clearly a possibility that economics may force us to use different satellites for the Caucasus than Central Asia. It is probable that such a split in communication will occur eventually, because fibre is becoming cheaper in the Caucasus more rapidly than in Central Asia. As we move towards requiring the partner countries to come up with their own funds, the economics will become the prevalent factor.

### 2.1.6 Relationship with Funders

There have been further discussions with four organisations, ISOC, the Soros Foundation, the University of Central Asia, the World Bank and Wageningen University. These are listed in the order of probable finalisation. The discussions with the World Bank have ceased for the time being.

- The \$122,000 from ISOC for workshops has been mainly spent. We are now discussing a further tranche of funding with them for further workshops.
- The Open Society Initiative (OSI) continues to be very positive to the project; and to provide funds nationally. They have made it clear that they will provide some funding for the Silk network – but mainly through their local organisations. They would prefer the two regions to continue to act as a common activity.
- There has been continued contact with the University of Central Asia (UCA), who need to connect together its proposed sites in Tekeli (Kazakhstan), Naryn (Kyrgystan) and Khorog (Tajikistan). A proposal has been made to the NATO Panel (not directly to Silk) to provide a different VSAT system, using the same Eurasiasat satellite system with a hub in Almaty. This would connect not only the UCA sites, but also some additional Kazakh sites. The fate of that proposal, and its relation to Silk, is still *sub judice*.
- Both Wageningen University and the World Bank would like to have fairly substantial amounts of bandwidth for videoconferencing on an occasional basis – a few hours per week. We are exploring mechanisms by which this could be provided, without impacting the rest of the system.

Both Georgia and Uzbekistan are now purchasing some extra bandwidth. The Georgians are purchasing only transmit bandwidth, since the Silk Receive bandwidth is more expensive than they can obtain from an alternate carrier.

## 2.2 WP 2 - Infrastructure Services

Here the project has three tasks:

- A2.1 Liaison with other relevant projects
- A2.2 Dissemination of information on the Silk project itself
- A2.3 Workshops

### 2.2.1 Liaison with other Projects

During this project, there has been strong collaboration with IABG under the aegis of their IPv6/DVB project. IABG provided an encoder to site at Hamburg, and six decoders which were sited at Hamburg, Almaty, Ashgabad, Baku, Tashkent and Tblisi. ESA provided some test bandwidth for tests with these cards. We had some problem with the cards under high load when there were substantial errors on the link, but on the whole the cards worked well. Their satellite coding is relatively inefficient, so it is unlikely that we will continue to use them for too long. We completed the initial phase of that work by giving a live demonstration

of native IPv6 video-conferencing with Almaty, Baku, Tashkent, Hamburg and Noordwijk in the ESA laboratories. This was sufficiently successful is that we plan to tune some of the user agents better, and repeat the activity in IST-2004.

### 2.2.2 Dissemination

Prof. Kirstein has provided presentations on the Silk and SPONGE activity at the APAN conference in Cairns. He provided a keynote on IPv6 activity, a talk at the IPv6 Forum on EC IPv6 activity, and one at the Coordinating Committee for Intercontinental Research Networks on Silk/SPONGE. Other talks on this subject were given at a London Seminar at UCL on September 13, and at an IPv6/Satellite workshop in ESA on September 20.

### 2.2.3 Workshops

In addition to these first IPv6 tests, there was an agreement with 6NET to provide some more bandwidth for dissemination, and to hold an IPv6 workshop. The workshop was held in Hamburg (led by Frese, September 15-17), and included practical work with IPv6/satellite as well as normal IPv6 tutorials. The presentations included Russian translation. The Programme of the Workshop, the slides presented and the list of attendees are available on the Silk web site. It is a sign of success in dissemination that all the Silk partners want to continue with IPv6 activity; we are now discussing how we can continue this work – probably with tunnels over the satellite network because of the inefficiency of the native IPv6 cards.

There were two further workshops with the funding from ISOC, given in Russian. There were:

- **Security (Yerevan, Armenia)**, This was led by Babayan of ARENA.
- **Distance Education (Baku, Azerbaijan)** This was led by Aliyev of AZRENA.

The reason that the IPv6 workshop was in Hamburg is that it involved also the staff of IABG, and showed how the IPv6/DVB equipment can be used.

There was a further workshop on wireless partially funded as a NATO Advanced Networking Workshop was held in Budapest in August. This had a number of Silk partner attendees, funded from the Silk project.

Arena has provided most of the translation facilities for documents into Russian. Unfortunately the person who was doing it is leaving ARENA, so that another person must be found for this.

## 2.3 WP 3 – Technical Activities

Here the project has three tasks:

A3.1 Configuration

A3.2 Infrastructure Measurement

A3.3 Caching

### 2.3.1 Configuration

Under configuration, the main activity has been setting up the IPv6 sites, so that they could use the new IPv6 boards from IABG. We also had to set up the multimedia tools VIC and RAT, though this has not been completed. Boards have been set up in Almaty, Baku, Tashkent and Tblisi – as well as Hamburg.

### 2.3.2 Statistics and their Impact

As usual, the complete traffic statistics are available on the Web. The figures for use of the IPv6 link have been added. We give below a summary of the traffic for the whole quarter.

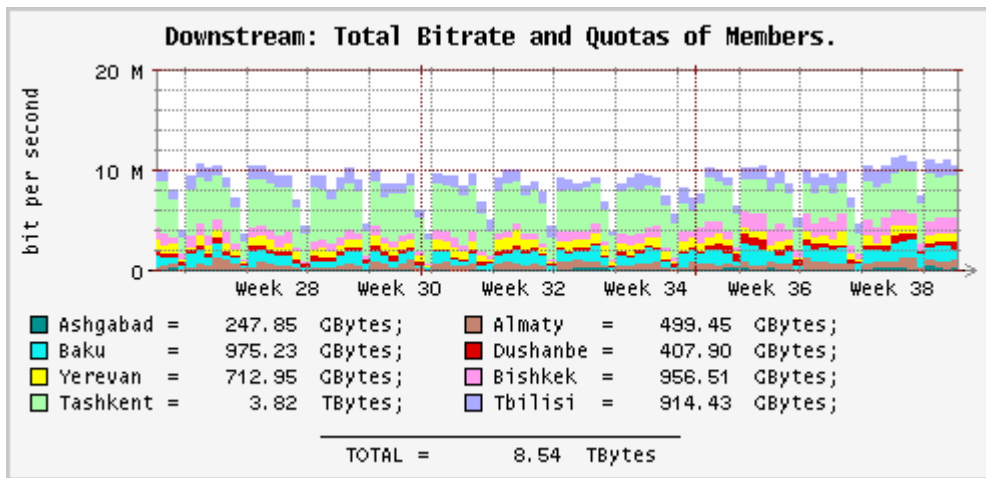


Figure 3 The Traffic Received for Q3 2004

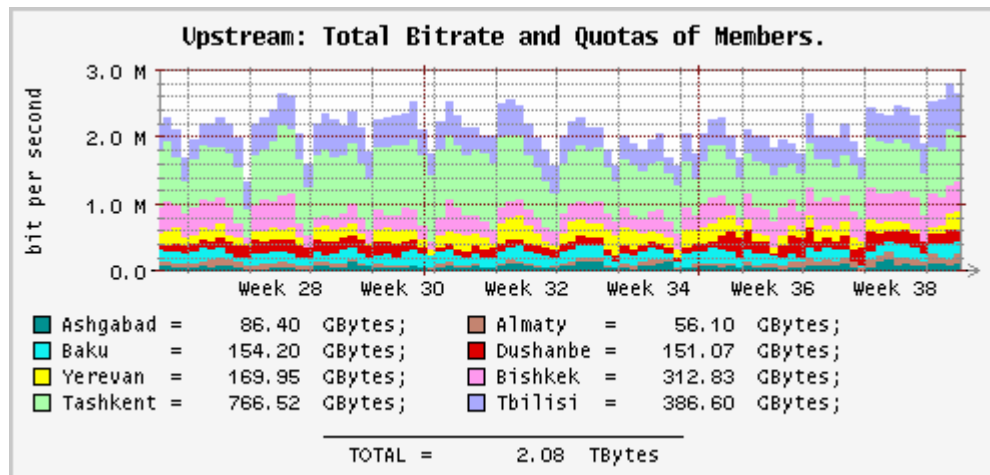
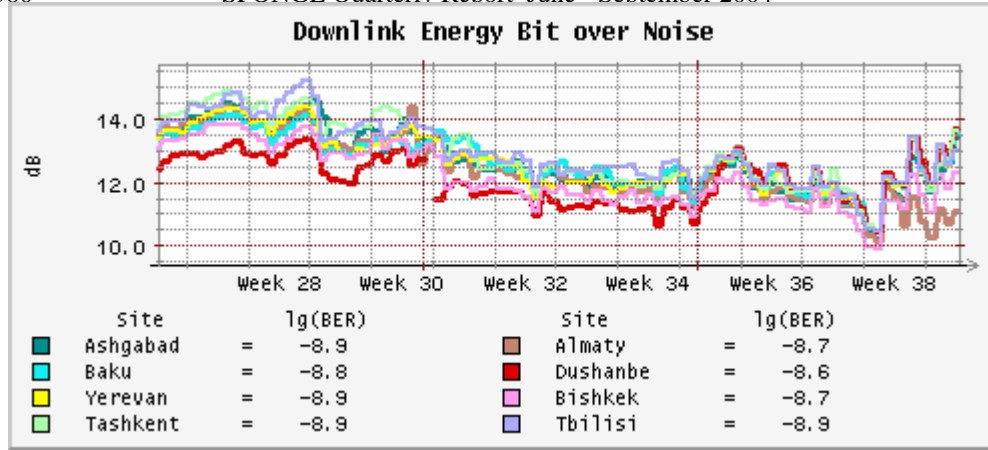


Figure 4 The Traffic Transmitted for Q3 2004

We have now implemented not only allocation of bandwidth on the SCPC transmit channel, but also Committed Information Rate on the common DVB channel. Thus although Tashkent and Tbilisi have almost similar transmit capacity, the receive data on the Tashkent channel is almost twice that of the Tbilisi one. This is because Tbilisi requested that it be allowed extra bandwidth on the transmit side only; it was getting much of its received traffic from another carrier because it was cheaper. The traffic policing ensured that this could be implemented. These figures show also which of the countries have the largest amount of traffic.

The figures show a slow growth from quarter to quarter. The received/transmitted data has grown from 7.58/1.66 TB in Q1 to 8.28/1.87 TB in Q2 and 8.66/2.08 TB in Q3. While some extra capacity was put in during Q3, most was used for the IPv6 testing. This is because this version of the cards requires an extra channel for the tests.

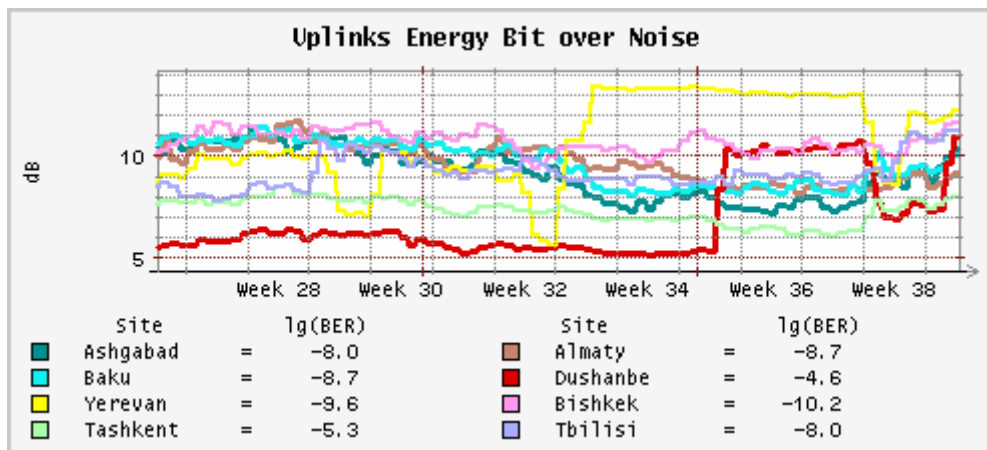
A very useful measure of the health of the system is the signal/noise ratio. The figures for the quarter are given in Fig. 5.



**Figure 5 The Downlink Signal to Noise Ratio for Q3 2004**

This figure shows that the signal to noise ratio is reasonably good most of the time, and normally varies little between the different countries. This is not surprising, since they are using the same DVB channel, and we do not expect any errors due to the equipment itself. Nevertheless, there are significant problems shown during the beginning of Week 38; these could be due to the whole system or to weather. Later Almaty shows clearly a worse performance, and this is being investigated.

The uplink signals/noise ratio is shown in Fig. 6 for the quarter.

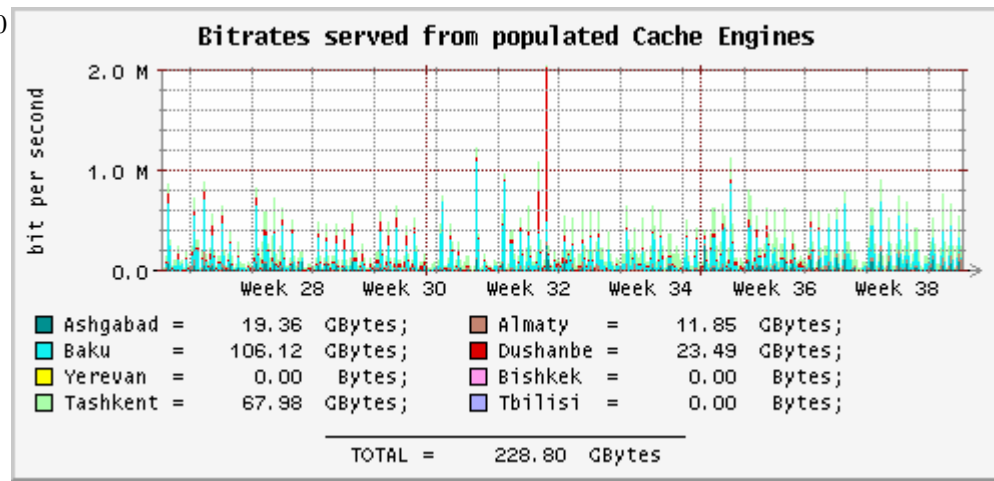


**Figure 6 The Uplink Signal to Noise Ratio for Q3 2004**

This figure indicates that there are still problems with some BUCs; the signal to noise ratio of the Yerevan and Dushanbe up-links was poor; the first was replaced in week 32 and the second week 35 – greatly improving performance. The reason for its deterioration again is being investigated. Dushanbe is not operating at too high a data rate, so this is not too serious. However, Tashkent is also giving trouble. Because it has one of the highest data rates, it is very serious. We will probably replace its BUC by an Advantec one.

**2.3.3 Caching**

In the Silk Board meeting, it became clear that the situation with the Cache engines is very unsatisfactory. The actual figures are shown in Fig. 7.

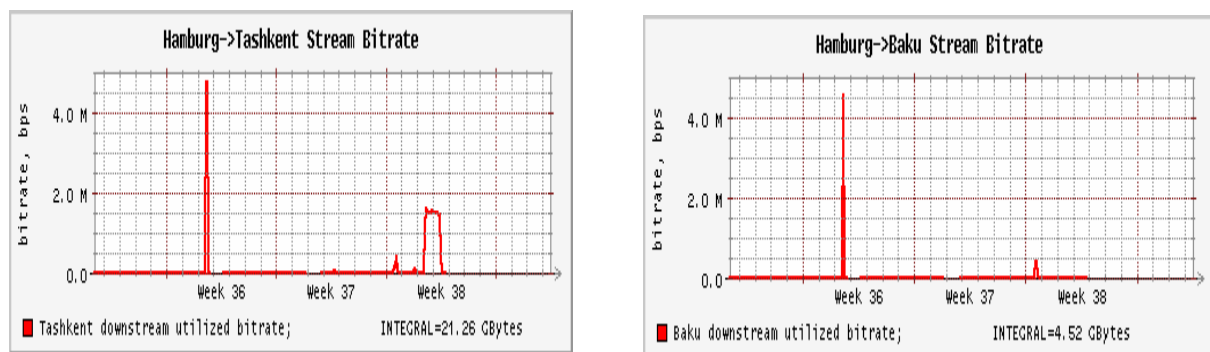


**Figure 7 Bit rates served from the Populated Caches**

Figure 7 shows the amount of traffic which is met from the cache. This must be compared with the traffic in Fig. 3. In some countries, e.g. Baku, the percentage of the traffic coming from the cache is very high. In others, e.g. Tashkent, it is still significant; in many it is zero. This last reflects, of course, that the cache is actually switched off. The reasons for these differences were discussed in the Silk Board, and we have requested a report on the reasons for turning off the cache from the NOC. It appears that one reason is that some sites are already running their own caches, and these may even interfere with the Silk cache. In other cases one tried to upgrade the software, and this failed; as a result none of the cache software has been upgraded since. In a third case, the cache failed, and the box would have to be returned to Cisco for repairs. However the site (Tbilisi) would have to pay 20% of the full purchase price in duty. Hence it is being kept there, switched off, while alternatives are being explored. As a result of the report requested, we will decide what to do with the caches. If they are not used as web caches, they could still be very valuable for as local file servers.

**2.3.4 IPv6 Activity**

For the IPv6 activity, it was first necessary to make the routers run dual-stack. This was done in July. We have mentioned that we have installed new DVB boards from IABG for IPv6. These affect only the receive side, where a separate channel is required. The equipment was installed in Hamburg during July, and first installed using a test channel, with the hub and remote there. Some early problems were remedied together with IABG. We were ready to do remote installations, but the usual problems with vacations and the unavailability of key staff meant that the remote installations were delayed until September. Most of the tests were done in preparation for the Review of the IABG project which developed the Board. This test took place during week 38. The resulting tests are shown in Fig. 8.



**Figure 8. IPv6 DVB Traffic to Tashkent and Baku**

At the Silk Board meeting in Dushanbe, all partners expressed interest in continuing with IPv6 activity. In practice, we will work with those who have the boards to make sure that we can get good video conferencing going with RAT and VIC for IST 2004. We will then stop using those boards, because they use only QPSK coding – giving us only 0.92 bits with the 8PSK coding used on our normal boards. Even if we have additional overhead through using IPv6/IPv4 tunnels, this is less expensive than the overhead from the cruder modulation.

We then expect to run both conferencing and normal traffic over IPv6 for the remainder of Silk-I. The exact mechanisms are still being worked through. In this we will work with all the Silk sites interested – and will make them an extra allocation of bandwidth to those who participate as an inducements,

## **2.4 WP 4 – Personal Communications**

The organisation of the audio-conferencing still remains unchanged, and is now in routine use. The present Cisco phone software still allows only three-way conversations on the phones by themselves. The two Cisco phones for each Silk partner site have been delivered. Unfortunately DESY and UCL use different mechanisms for initiating Voice/IP (VoIP) calls. DESY uses the Cisco proprietary mechanism, UCL uses SIP. Neither can change because of other uses of VoIP in the two institutions. We have decided to register one of the IP phones with each system, and put in MCUs in each location, to ensure that full connectivity can be maintained. This was mooted earlier, but has not yet been completed.

For a while the activity in video-conferencing (VC) was reduced. With the pressure from Wageningen U and the World Bank, we are exploring how substantial amounts of bandwidth can be allocated for VC without disrupting service for the existing uses.

### 3 STATUS OF DELIVERABLES AND MILESTONES

#### 3.1.1 The Technical Deliverables

Del. No	Del. Name	WP No	Lead Participant	Est. Pm	Plan	Target	Actual
D1	Terms of Reference of the Different Committees	1	UCL	1	03-03	03-03	03-04
D2	Covering paper on the services available and the status of the Silk Sites	2	RUG	6	09-03	09-03	10-03
D3	Detailed Report on the performance of the Silk system over the previous quarter	3	RUG	3	08-03	08-03	<b>10-03</b>
D4	Report on resources required for, parameters needed for, and experience with VoIP in the Silk Environment	4	UCL	4	09-03	09-03	<b>10-03</b>
D5	Status of NRENs and their regulatory environment in the Silk countries	1	UCL	1	12-03	02-04	04-04
D6	Minutes and Working Papers of the Committees after first year of operation	1	UCL	1	03-04	03-04	04-04
D7	Table of Contents of two co-sponsored workshops	2	RUG	2	03-04	03-04	04-04
D8	Preliminary Report on the advantages gained on caching	3	RUG	3	03-04	03-04	04-04
D9	Report on the performance of the Silk system over the previous quarter	3	RUG	4	08-04	10-04	
D10	Report on resources required for parameters needed for, and experience with the Mbone tools in the Silk Environment	4	UCL	4	11-04	11-04	
D11	Minutes and Working Papers of the Committees after second year of operation	1	UCL	1	11-04	11-04	
D12	Final Report on the advantages of caching	3	RUG	4	02-05	02-05	
	Total						

We wish to delay the completion of Deliverable D9, because there have been substantial changes in configurations in the Silk Network. We will now provide performance figures for third quarters of 2004.

### 4 ISSUES

Travel costs – both for Silk Board meetings and for dissemination, have been higher than planned. We are requesting transfer of funds from staff to travel.

### 5 PARTNER DETAILS

None

## 6 MEETINGS

### 6.1 Project Meetings

Here we list only physical meetings. The bulk of the meetings are telephone meetings.

Date	Location	Participants	Outcome
July 24	ESA, Nordwijk, NL	Kirstein	Discussions on IPv6/Silk project
Sept 20	ESA, Nordwijk, NL	Kirstein	Presentation and Demonstration at ESA IPv6/Satellite meeting
Sept 27	Dushanbe, TJ	Kirstein, Janz, Kvatadze, Babayan	Talk on Silk and meeting with UNDP, CADA and Tajik government bodies
Sept 28/29	Dushanbe, TJ	Kirstein, Janz	Silk Board and SPONGE Meetings

### 6.2 Conferences/workshops organised

Conferences or Workshops have been organised in this Quarter.

Date	Location	Participants	Outcome
Sept 15-17	DESY, Hamburg, DE	Kirstein, Kvatadze	Workshop on IPv6
Sept 28/29	Dushanbe, TJ	Babayan, Janz, Kirstein, Kvatadze	Silk Board and SPONGE Meetings

### 6.3 Conferences attended and Presentations Given

Date	Location	Topic	Participants	Outcome
July 3-7	Cairns, AU	Silk Project and IPv6/Silk	Kirstein	Presentations on Silk to the APAN and CCIRN meetings
Sept 13	UCL, UK	Communications	Kirstein	Presentation about Silk at LSTN meeting
Sept 20	ESA, NL	IPv6/Satellite	Kirstein, Novotny	Presentation and Demonstration

### 6.4 Submission of papers

Topic	Abstract	Journal/Conference	Status
Silk status report	Overview of the current status of the Silk project	APAN and CCIRN, Cairns, AU	Presented
Paper on Silk Status	Lessons learnt from project	IPSI Conference, Manchester, UK	Accepted

## 7 EFFORT FOR THE REPORTING PERIOD NOT DONE TET

Resource allocation (Partner vs. WP) for the reporting period (man-months)

PLEASE STATE YOUR EXPENSES THIS QUARTER

### SUMMARY Q8

	WP 1	WP 2	WP 3	WP 4	Total	Uncharged
P01	0.4	0.2	0.3	0.4	<b>1.3</b>	<b>0.4</b>
P02	0.5	0.5	0.5	0.5	<b>2.0</b>	<b>1.0</b>
P03	0.5	0.0	0.0	0.0	<b>0.5</b>	<b>0.5</b>
P04	0.3	0.2	0.2	0.1	<b>0.8</b>	<b>0.8</b>
<b>Total</b>	<b>1.7</b>	<b>0.9</b>	<b>1.0</b>	<b>1.0</b>	<b>4.6</b>	<b>2.7</b>

### Previous Q1 – Q7

	WP 1	WP 2	WP 3	WP 4	Total	Uncharged
P01	3.6	1.1	0.9	3.0	<b>8.6</b>	<b>2.7</b>
P02	3.1	4.7	3.6	1.5	<b>12.9</b>	<b>4.0</b>
P03	1.5	0.0	0.0	0.0	<b>1.5</b>	<b>1.5</b>
P04	1.5	1.0	1.0	0.5	<b>4.0</b>	<b>4.0</b>
<b>Total</b>	<b>9.7</b>	<b>6.8</b>	<b>5.5</b>	<b>5.0</b>	<b>27.0</b>	<b>12.2</b>

### Cumulative Q1 – Q8

	WP 1	WP 2	WP 3	WP 4	Total	Uncharged
P01	4.0	1.3	1.2	3.4	<b>9.9</b>	<b>3.1</b>
P02	3.6	5.2	4.1	2.0	<b>14.9</b>	<b>5.0</b>
P03	2.0	0.0	0.0	0.0	<b>2.0</b>	<b>2.0</b>
P04	1.8	1.2	1.2	0.6	<b>4.8</b>	<b>4.8</b>
<b>Total</b>	<b>11.4</b>	<b>7.7</b>	<b>6.5</b>	<b>6.0</b>	<b>31.6</b>	<b>14.9</b>

## 8 EXPENDITURE NOT DONE YET

The financial information contained in this report is estimated and does not represent a legally binding statement of costs.

The figures are quoted in Euros, using the exchange rates of 0,7 £/Euro for Partner 1.

### 1.1 Durable Equipment Expenditures

Date*	Description	Depr	% Allocation to Project	Used for	Amount
Total for quarter					
Previous Total					
Total Cumulative from start of the project as originally planned					

## 1.2 Travel and Subsistence Expenditures

Date*	Description	Used for	Part	Euro
Sept 27-30	Travel and DSA to Dushanbe	Kirstein at 7 <sup>th</sup> Silk Board	P1	€1800
Sept 27-30	Travel and DSA to Dushanbe	Janz at 7 <sup>th</sup> Silk Board	P1	€1800
Total for quarter				€3600
Previous Total				€25000
Total Cumulative from start of the project				€28600

## 1.3 Consumables Expenditures

Date*	Description	Depr	% Allocation to Project	Used for	Amount
Previous Total					300
Total Cumulative from start of the project as originally planned					300

\* Invoice Date

## 9 OTHER INFORMATION

None

## REFERENCES

None