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**SILK Project Operations Networking and GEANT Extension
SPONGE**

Deliverable D3: Performance of the Silk system in Q3 2003

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Abstract: The Deliverable presents an overview of the performance of the Silk system during the third quarter of 2003

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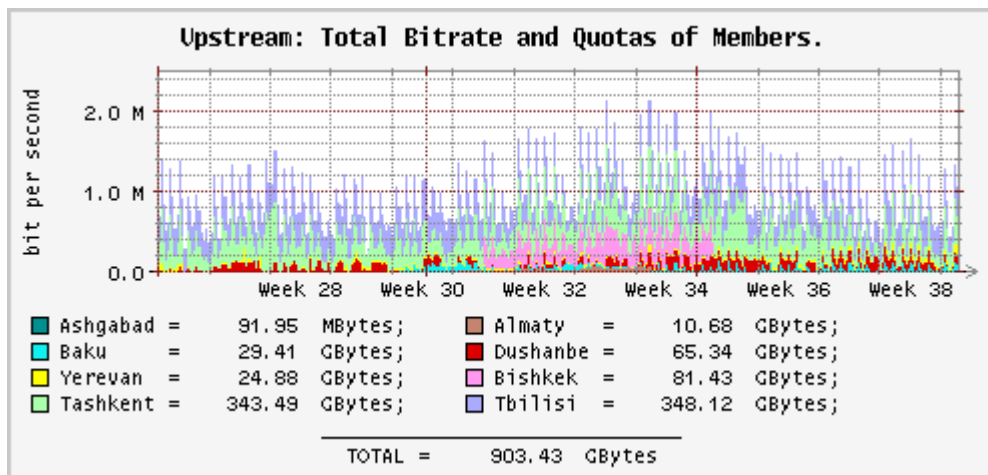
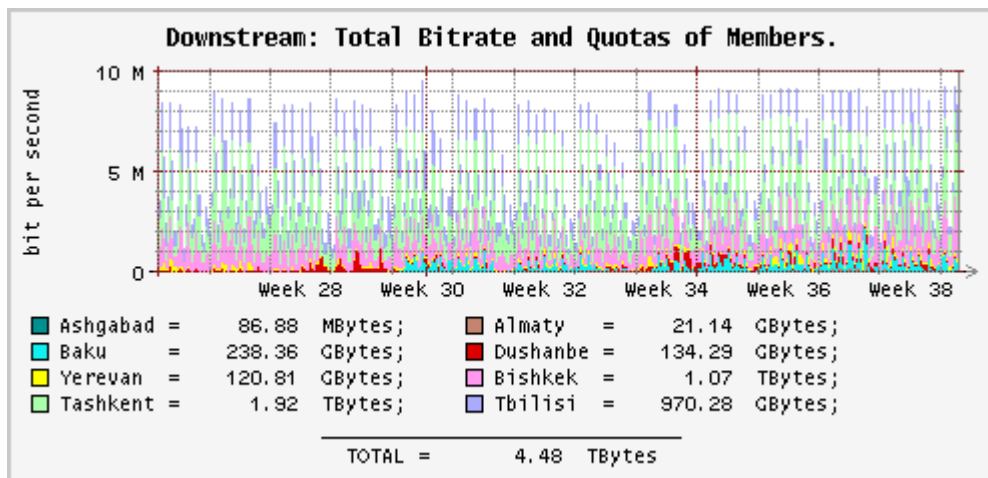
1 Introduction

In the third quarter of 2003 an important milestone was reached: the last of the eight dishes was successfully installed in Ashgabat (Turkmenistan). This report provides an overview of the performance of the Silk system between July 1 and October 1 of 2003. In section 2 the bandwidth usage is presented. In section 3 the cache usage of one of the countries (Georgia) is presented. Section 4 provides an overview of the problems that have occurred during the report period.

The current (September 30, 2003) status of the Silk infrastructure and the services that are available is described in the SPONGE deliverable D2. This document also contains reports from the Silk countries that provide information regarding the performance of the Silk system during Q3 of 2003.

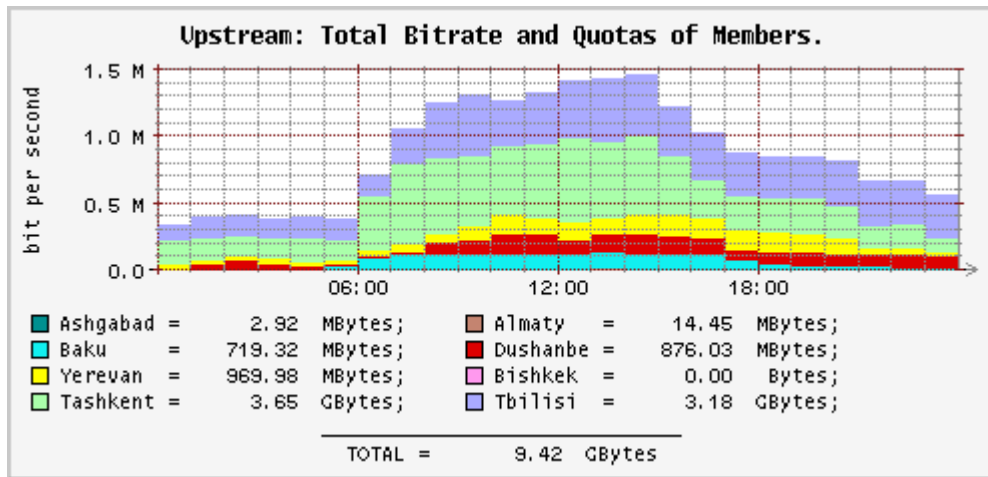
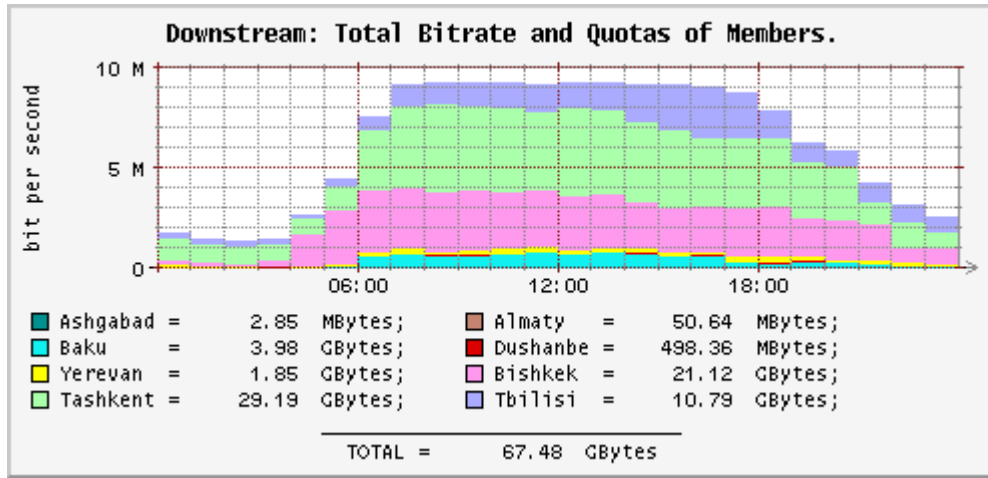
2 Bandwidth usage

The following two graphs present the bandwidth usage of all the countries during Q3 of 2003. Down stream is the west to east transmission and up stream is the east to west transmission.



Georgia (Tbilisi) and Uzbekistan (Tashkent) are clearly currently the largest users of the connectivity (65 % of the down link and 76 % of the up link capacity). As Kazakhstan (Almaty) and Turkmenistan (Ashgabat) have been connected only recently their usage of the system falls behind compared to the other countries. In Azerbaijan (Baku), Tajikistan (Dushane), Armenia (Yerevan) and the Kyrgyz Republic the transmit unit of the satellite earth station isn't functioning properly (the Kyrgyz transmit is even turned off most of the time). As the uplink capacity of these four stations is limited the down link usage is less than in the two countries that have full operation dishes. In Armenia the restrictive AUP policy that is enforced by the national telecom operator is also reason for less usage of the available bandwidth.

What cannot be demonstrated in the graphs on the previous page is the saturation of the system during the day time. Therefore the following two graphs show the network activity during a single day (September 30 2003):



The time scale in these graphs refer to Hamburg time (CET). The down stream graph clearly demonstrates that the system is fully saturated from 7 o'clock in the morning to 6 o'clock in the afternoon. Because of the time difference between Central Asia and the Caucasus countries Uzbekistan and the Kyrgyz Republic has relatively sufficient bandwidth in the first part of the morning.

3 Cache performance

In each of the eight countries a Cisco Content Engine with 185 GigaByte storage is installed. The Content Engines store the static http pages that are being requested from the country. In contrast to prior belief not all the information is being stored. Dynamic http pages are not stored and even though the information meant for all the countries is received by every dish, only the country specific information can reach the Content Engine. The Content Engines work independently of each other and are managed by the technical staff at DESY.

As there is no reason to believe that the Content Engines behave differently in the individual countries for this report only the statistics of the Georgian Content Engine have been calculated (see Table 1).

Stream	Value	Dimension
Hamburg -Tbilisi	970.3	Gigabyte/Quarter
Tbilisi - Hamburg	348.1	Gigabyte/Quarter
Tbilisi Cache Requests served	7.3	req/s

<i>Tbilisi Cache served HITS</i>	2.7	<i>req/s</i>
<i>Tbilisi cache served mean bit rate total</i>	460.6	<i>Kb/s</i>
<i>Tbilisi cache served mean bit rate as HITS</i>	88.9	<i>Kb/s</i>
<i>Tbilisi cache savings bit rate</i>	18,5%	
<i>Tbilisi cache savings requests</i>	37.0%	
<i>Tbilisi cache served HIT mean object size</i>		<i>Kbyte</i>
<i>Tbilisi CE mean number TCP connections</i>	99	<i>Connections</i>

Table 1: Statistics of Georgian Content Engine Q3 2003

It should be noted that the saving percentage concerns only the http traffic going through the satellite connection. This is approximately 50% of the total traffic. So the actual gain from the Content Engine is about 9 % of the total use of the connection.

4 Problem report Q3 2003

The list of problems that have occurred during Q3 2003 as received from the technical staff at DESY is presented in table 2:

Index	Location	Problems	Description
1	HUB station in Hamburg	Yes	On September, 8 21:00 failure of the Power Amplifier XiCOM. Redundant one is switched on. Faulty one is unmounted and directed to repair. The station has no redundant HPA.
2	Uzbekistan	No	-
3	Georgia	No	-
4	Kyrgyz Republic	Yes	"Pedestal" under the spectral line due to the high phase noise level. Produces problems for neighbor carriers. It is switched off for this reason 09.05.2003. The station works in receive only mode. On August, 6 the transmission again switched on. Has worked till September, 4.
5	Tajikistan	Yes	Spontaneous output power appear / disappear. Breaks of communication reach 12 hour. It is eliminated by power supply reset. The station does not transmit 1/5 of time on the average.
6	Armenia	No	-
7	Azerbaijan	Yes	Take place spasmodic reduction of BUC gain by 8 dB from maximal. It is compensated by corresponding increase in modulator output power.
8	Kazakhstan	No	The station is put into operation on July, 25. The transmitter was under repair is established. This transmitter (BUC) at tests after repair in Hamburg worked with problems, periodically giving «side lobes» in spectrum. Because of absence of another BUC we had to mount this. Critical problems were not yet occur but giving «side lobes» appear every day.
9	Turkmenistan	No	The station is put into operation on August, 21. This transmitter (BUC) at tests after repair in Hamburg worked with problems, periodically giving «side lobes» in spectrum like the one in Almaty. Because of absence of another BUC we had to mount this. Critical problems were not yet occur but giving «side lobes» appear every day.

Table 2: Problem list Silk system Q3 2003

It is clear that only two of the eight sites are working correctly (Uzbekistan and Georgia). Kazakhstan and Turkmenistan also seem to be functioning normally, but there are indications that the transmitters will also here cause difficulties once the capacity is increased. For Armenia the restricted AUP does not allow heavy use of the system and it is therefore not certain whether the transmit unit is in good order.

In October Kalitel, the manufacturer of the ground stations, will visit various sites for corrective maintenance.