

**Project no. 015926**

**6DISS**

**IPv6 Dissemination and Exploitation**

Instrument: SPECIFIC SUPPORT ACTION

Thematic Priority 2

**D09: Report on the workshop and status of Internet connectivity in the NIS countries**

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UCL

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**Executive Summary**


This deliverable provides a detailed report on the workshop held on 24<sup>th</sup> - 26<sup>th</sup> April 2007 in Ashgabat, Turkmenistan. There was wide attendance from the NIS countries and Afghanistan. The workshop received high level media and political coverage in Turkmenistan, being opened by government officials and covered on national television. The deliverable also reports on the status of the Internet connectivity in the NIS countries and Afghanistan provided by SILK-2 and OCCASION.

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
<b>PU</b>	Public	✓
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

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## 1. Introduction

This deliverable is a report from the 6DISS technical workshop for NIS countries and Afghanistan that took place on the on 24<sup>th</sup> – 26<sup>th</sup> of April 2007 in Ashgabat, Turkmenistan. The report includes information on the workshop programme, the presentation and dissemination material distributed to participants, the attendees and their affiliation, a summary of the feedback questionnaire, analysis of the workshop costs, and information about the workshop sponsors.

The workshop received a high level of interest in Turkmenistan, with involvement and attendance by government officials. The event was also covered by the national television network and the press. The workshop was attended by 19 participants from the region, with 4 lecturers covering the material.

The deliverable also includes a description of the status of the major Internet connectivity links deployed by the NRENs in the NIS region at the time of the 6DISS workshop and presents on-going IPv6-related activities.


Most of the previous 6DISS workshop reports have summarized the 6DISS project goals and activities. Therefore, this information has not been included in this report, considering first it is now well-known and second it is available on the 6DISS web site<sup>1</sup>.

The workshop public web site can be accessed through the following URL:

<http://www.6diss.org/workshops/nis/>

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<sup>1</sup> <http://www.6diss.org>

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## 2. Workshop for NIS countries and Afghanistan

### 2.1. General information

This 6DISS workshop was organised by the 6DISS partners in conjunction with OCCASION and SILK projects, specifically by UCL, the Turkmen Supreme Council of Science and Technology, and NIIF/HUGARNET. The tutors were from UCL, NIIF/HUGARNET, and ISPRAS.RU. The training workshop was held on 24-26<sup>th</sup> April 2007 in the premises of the Supreme Council, Ashgabat, Turkmenistan. The international connectivity for the workshop was provided by the SILK-2 satellite network.


Whilst the official language of the workshop was English, quite a number of the participants understood Russian much better. To facilitate Russian language explanations, we arranged that one of the workshop tutors would be Russian; in addition, a number of the local organisers assisted in translation. Additionally the self-learning module from 6DISS was translated into Russian and made available to the attendees.



**Figure 1: Workshop attendees at the Academy of Sciences**

### Summary of the details of the 6DISS workshop in Turkmenistan:

<i>Date:</i>	<i>24<sup>th</sup> - 26<sup>th</sup> April 2007</i>
<i>Location:</i>	<i>Ashgabat, Turkmenistan</i>
<i>Local organiser:</i>	<i>Supreme Council of Science and Technology</i>
<i>Lead 6DISS partner:</i>	<i>UCL</i>
<i>Supporting 6DISS partner:</i>	<i>NIIF/HUGARNET</i>

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## 2.2. Attendees

The participation was organised by requesting nominations from the members of the Silk/OCCASION Board, which is responsible for the Silk and OCCASION projects. Each Board member was asked to nominate up to three participants from his/her country – with the conditions that they understood English and had good grounding at least in IPv4 technology.


The majority of the attendees were technical personnel from NRENs, universities, and public institutes in the region. There have been some test deployments of IPv6 in the region, and the organisations are keen to experiment and deploy IPv6 technology in the future.

The majority of the attendees had limited (or no) previous experience of IPv6 technology, though all had a basic background in IPv4 networking. However some of them had very good knowledge of IPv6.

Surname	Country	Work place and position	E-mail
<b>Students</b>			
Ogai	Afghanistan	Asst Prof, Kabul U	aogai@ku.edu.af
Hedayati	Afghanistan	Asst Prof, Kabul U	hhedayati@ku.edu.af
Sahab	Afghanistan	Asst Prof, Kabul U	sahab_zoia@yahoo.com
Mkoyan	Armenia	Yerevan Physics Institute, Network Admin	sako@yerphi.am
Guliyev	Azerbaijan	AzRENA, System Administrator	admin@azrena.org
Khodosov	Azerbaijan	AzNET Systems Manager	ekhodosov@noc.aznet.org
Rotkin	Azerbaijan	AzNET Networks Manager	drotkin@noc.aznet.org
Datukishvili	Georgia	Caucasus University, IT Manager	giorgi@csb.ge
Butshkhrikidze	Georgia	Caucasus University, IT Manager	dima@csb.ge
Japarov	Kazakhstan	Professor, General director Kazrena	bjaparov@kazrena.kz
Tusupova	Kazakhstan	Tuzan University	saule.tusopov@mail.ru
Fotin	Kyrgyzstan	AkNet, System administrator	admin@aknet.kg
Imanakunova	Kyrgyzstan	KRENA, IT Specialist	imanakunova@krena.kg
Davlyatov	Tajikistan	TARENA, System administrator	alisher@tarena.tj
Muminov	Tajikistan	TARENA, Network administrator	mukaddas@tarena.tj
Gontcharuk	Turkmenistan	Academy of Sciences	
Ponomarenko	Turkmenistan	Academy of Sciences	
Ustimenko	Uzbekistan	UZSCINET Network Administrator	den@uzsci.net
Kozlov	Uzbekistan	UZSCINET Network Developer	fish@uzsci.net
<b>Lecturers</b>			
Kirstein	United Kingdom	Professor, UCL	kirstein@cs.ucl.ac.uk
Mohacsi	Hungary	Head Network Planning, Hungarnet	mohacsi@niif.hu
O'Hanlon	United Kingdom	Senior Researcher, UCL	p.ohanlon@cs.ucl.ac.uk
Pakulin	Russia	Institute for System Programming, RAS	npak@ispras.ru

**Figure 2: List of attendees**

As is clear from the above list, each of the Silk countries (including Afghanistan) was represented. There were three representatives from three countries (Afghanistan and Azerbaijan), two each from Georgia, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, and one only from

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Armenia. Another two were intending to come, but could not get away at the last moment. Four of the participants were female – including two of the Afghans.




**Figure 3: Workshop session**

### 2.3. Programme outline

The programme was put together based on previous workshops and modified to suit the needs of the local participants. The material used was strongly based on that presented at other workshops with some enhancements and modifications, whilst certain sessions were created from scratch. All material is available online from the 6diss website in PDF format.

Tuesday, 24 <sup>th</sup> April 2007		
10:00	<b>Opening session and training objectives 6DISS presentation</b>	Kirstein
10:30	<b>IPv6 basics : protocol, addressing</b>	O'Hanlon
11:30	<b>Associated protocols</b>	O'Hanlon
12:30	<i>Lunch</i>	
14:00	<b>Autoconfiguration: stateless &amp; stateful</b>	O'Hanlon
15:00	<b>LAB: Windows Host configuration</b>	Pakulin
15:30	<b>LAB: Linux host configuration</b>	Pakulin
16:00	<i>Break</i>	
16:15	<b>LAB: Autoconfiguration: RAs &amp; DHCPv6</b>	Pakulin

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17:30	<i>End of Day #1</i>	
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<b>Wednesday, 25<sup>th</sup> April 2007</b>		
09:00	<b>DNS</b>	<b>Mohacsi</b>
09:30	<b>Transition mechanisms</b>	<b>Mohacsi</b>
10:00	<b>Security</b>	<b>O'Hanlon</b>
11:00	<i>Break</i>	
11:30	<b>LAB: DNS</b>	<b>Mohacsi</b>
12:30	<i>Lunch</i>	
14:00	<b>Applications</b>	<b>O'Hanlon</b>
15:00	<b>Applications: Case study: Conferencing</b>	<b>O'Hanlon</b>
16:00	<i>Break</i>	
16:30	<b>LAB: Applications</b>	<b>Pakulin</b>
17:30	<i>End of Day #2</i>	

<b>Thursday, 26<sup>th</sup> April 2007</b>		
09:00	<b>IPv6 Routing</b>	<b>Mohacsi</b>
11:00	<i>Break</i>	
11:30	<b>LAB: Routing</b>	<b>Mohacsi</b>
12:30	<i>Lunch</i>	
14:00	<b>Network Management</b>	<b>Mohacsi</b>
15:00	<b>LAB: Network Management</b>	<b>Mohacsi</b>
15:45	<i>Break</i>	
16:00	<b>The next steps</b>	<b>Kirstein</b>
16:20	<b>Workshop Feedback Questionnaire</b>	<b>O'Hanlon</b>
17:20	<b><u>SILK meeting</u></b>	<b>Kirstein</b>
17:30	<i>End of Workshop</i>	

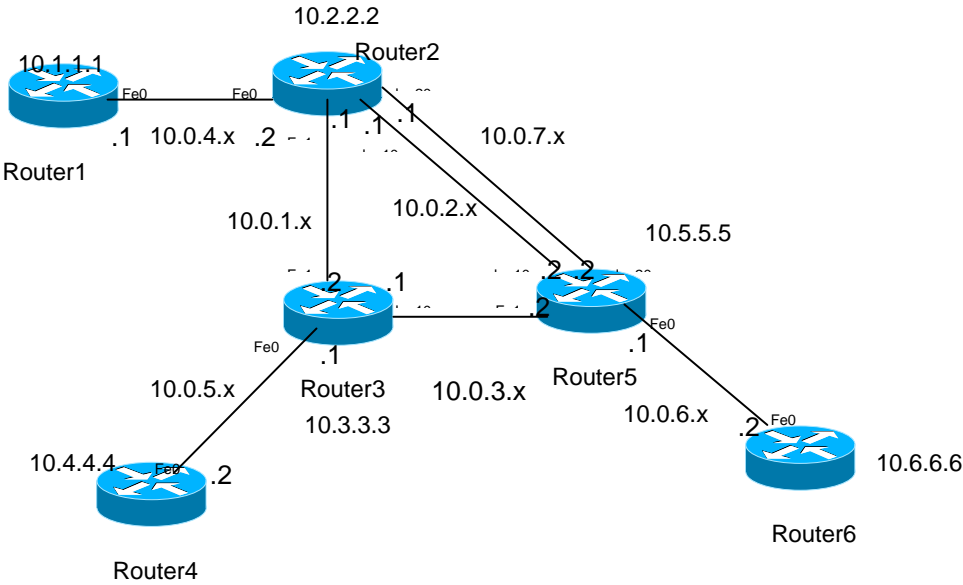
#### 2.4. Workshop labs

The workshop lab was well prepared with 15 dual-booting PCs by the local staff at the Academy of Sciences. The PCs were connected to the SILK-2 network via a local LAN. Connection to the IPv6 Internet was provided via a tunnel over SILK-2 to NIIF/HUNGARNET.

Piers O'Hanlon and Peter Kirstein brought the 6 Cisco routers (1812W models) with them to set a local network test-bed (Figure 4), similar to that used in the Guadeloupe workshop, which was




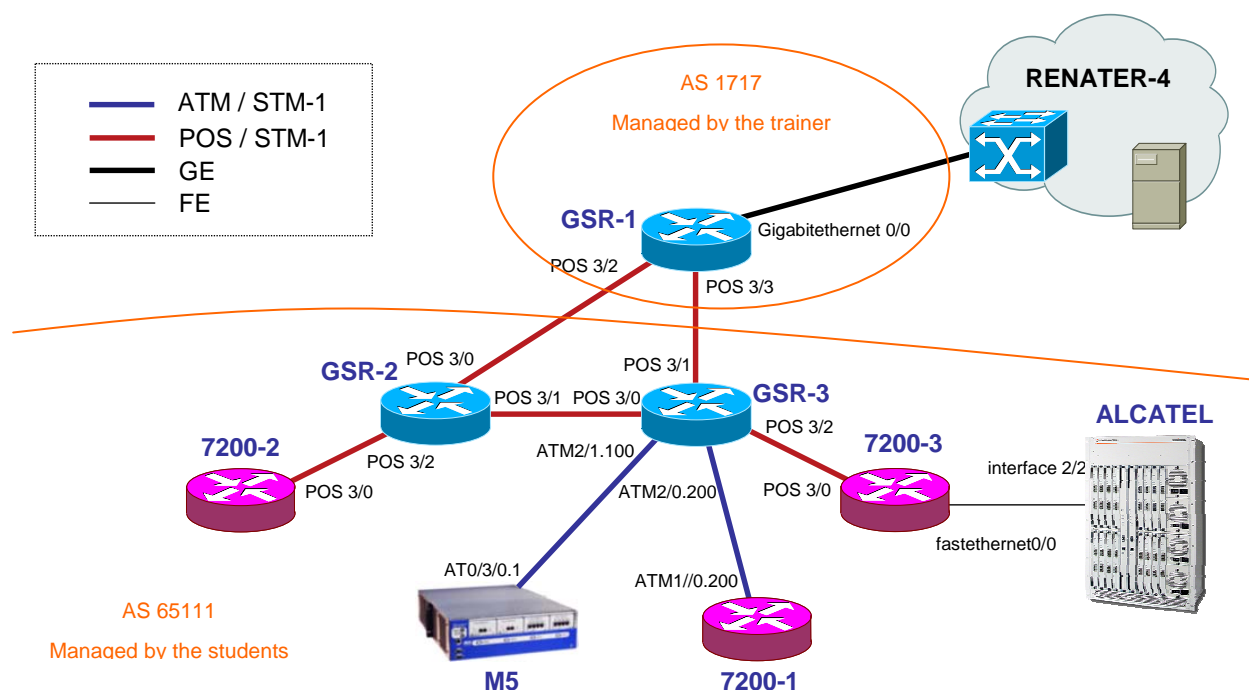
based on the Brussels lab and preconfigured by Bertus Habraken of Cisco. Additionally the RENATER Cisco lab in Paris (Figure 5) was made available for advanced users at the workshop. The local PC lab consisted of 15 PCs, was used for exercises on hosts and servers. Windows XP and Ubuntu Linux operating system were used to support the exercises related to basic IPv6 exercises, DNS, Applications, network services, and management tools.



**Figure 4: PC lab - Network topology and photo of routers in situ**



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**Figure 5: Lab topology in Paris**

## 2.5. Local sponsors

**Turkmen Supreme Council of Science and Technology:** The local staff at the Supreme Council provided all the equipment and connection to the SILK-2 network. They also organised the venue and provided all the logistics needs, providing for excellent local hospitality.


In addition to the official dinner on the Wednesday, there were dinners for some of the lecturers on each of the other evenings.

## 2.6. Press and Media Coverage

There was a high level of media coverage. The opening ceremony included was from the Head of International Relations of the Supreme Council of Science and Technology. Figure 1 shows that there was a large banner about 6DISS, the European Commission and NATO on the wall – which appeared in the television pictures. The first day there were both radio, television and newspaper interviews by Prof Kirstein. The interviews covered not only the 6DIS project, but also the Silk and OCCASION ones. However IPv6 figured strongly in the resulting articles.

## 2.7. Funding and Payments

The workshop was an event independent of any other activities. For this sort of event in this region, it was necessary to sponsor the full expenses both of the participants and of the workshop. Nevertheless, the actual costs of the local arrangements and the hotels was modest.. Thus the cost of the hotel (with breakfast) was only €40/night, and an extra €15 covered the dinner and incidental expenses. The lunches, transportation and refreshments were paid centrally. Because of NATO policies, the Afghan participants' expenses were paid at the normal Turkmen rate for NATO.

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The main payment difficulty was that the banking facilities are rather rudimentary – both in the host country and in those of some of the participants. Thus while it was possible to pay the hotel costs by credit card, the other expenses had to be re-imbursed in cash (US\$ brought in by Prof. Kirstein).

**NATO:** NATO funded the SILK-2 network and also provided sponsorship for the Afghan attendees.

**6DISS:** The EC, via the 6DISS project, funded the lecturers, travel and subsistence of all but the Afghans, and the central costs.

**Cisco:** Cisco provided the 6 routers, and their transport costs to/from UCL.

**The Supreme Council:** The Supreme Council provided the room, the PCs, the beamer, translation facilities for the Opening Ceremony and all the logistics.

**UCL:** UCL provided a small switch, because the large one provided by Cisco was rather large to transport in the baggage to Ashgabat.

## 2.8. Summary of Costs


<i>Description</i>	<i>Estimation of costs (In Euros)</i>	<i>Comments</i>
<i>Secretariat and services</i>	1500	Transportation to/from airport, refreshments, lunches (6DISS)
<i>Lecturers</i>	6000	Includes all travel and subsistence (6DISS)
<i>Participants</i>	12700	Paid by 6DISS
<i>Afghan Participants</i>	5500	Paid by NATO

## 3. Opportunities for further Co-operation

### 3.1. Follow-up actions

As for other workshops, the attendees were informed on how to keep contact with the 6DISS partners for any questions they may have regarding IPv6 deployment, addressing plan, etc. In this respect, the role of the so called *Tiger Team* was explained as being the way to submit questions. This team can be contacted via a mailing list composed by volunteers, who are available to answer (or forward) any kind of questions, requests, etc.

Discussions were had with the lecturer Nikolay Pakulin, from Institute for System Programming at the Russian Academy of Sciences, regarding collaboration with the 6DISS project on IPv6 testing. Pakulin specialises in IPv6 testing systems and frameworks at his institute and within other European projects. It would be desirable to add some testing modules to the 6DISS module set.

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### 3.2. Other workshops

There are other workshops near this region, including one in Bulgaria at the end of June. The Silk countries have been invited to send participants to that also; at least some will attend.

### 3.3. IPv6 Deployment

The workshop was held in the context of the SILK and OCCASION projects within which this knowledge and experience will be taken forward. The SILK project is already running Internet based conferencing over the network and hopes to provide IPv6 conferencing facilities over it soon.

## 4. Analysis of the feedback questionnaire

A questionnaire has been especially designed to obtain feedback from the participants, regarding the suitability of the course material and the presenters, to convey the information, and the relevance of the information to the expectations of the attendees.

Each participant was first requested to indicate:

- Their organisation and job responsibilities
- Plans for IPv6 deployment in their organisation

For each presentation and LAB session, each participant was requested to assess “How useful did you find the presentations”, “How well the sessions were presented”, and “How much material was already familiar”. These were followed by more general questions on the quality of the course documentation, general organization, and whether they would recommend the workshop. Finally the participants were provided with space for more details comments on what they would have liked to hear more or less about, and any other comments.

### 4.1. General Questions related to participants and IPv6

Total of feedback questionnaires received: 17


#### **Employment sector (some participants are from more than one):**

- 15 University or higher education
- 8 Research
- 4 Schools
- 1 Commercial

#### **Job Function:**

- 8 IT Manager
- 6 System administrators
- 8 network administrators
- 2 Researchers
- 3 Lecturers

None of the participants had IPv6 running in their organisation though 9 plan to deploy it in the next year and 6 have it planned in the longer term. 3 people are already using IPv6.

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## 4.2. Questions regarding the Workshop

Session Descriptions	Usefulness (%)	Presentation(%)	Familiarity (%)
<b>Day 1:</b> Introduction to 6DISS	83	84	63
IPv6 basics: protocol and addressing	87	81	70
Associated protocols	85	79	63
Autoconfiguration: stateless & stateful	83	79	59
LAB: Windows Host configuration	90	87	64
LAB: Linux host configuration	87	87	56
LAB: Autoconfiguration	82	82	53
<b>Day2:</b> DNS	83	79	63
Transition mechanisms	85	75	66
Security	82	76	63
LAB: DNS	82	81	66
Applications	84	78	59
Applications case study - conferencing	81	78	55
LAB: Applications	82	79	63
<b>Day 3:</b> Pv6 Routing	89	87	68
LAB: Routing	90	88	64
Network Management	83	81	59
LAB: Network Management tools	80	76	59

Quality of Documentation – 84%

General organization – 93%

Recommend to colleagues - 100%


## 4.3. Participants Comments

More topics to hear about, ordered by preference (number of people asking for more):

- Routing (5)
- Security (2)
- NAT (1)

Less topics to hear about, ordered by preference (number of people asking for more):

- Host configuration (1)

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Other Comments:

- Hoped there would be more workshops in other countries
- Interested in more LAB sessions
- Found the workshop very useful

## 5. Status of Internet connectivity in the NIS countries

The network is provided via the SILK project, which managed by the OCCASION project. Full details of the current connectivity are given in the Deliverables of the OCCASION project – in particular in D2.2 on the site <http://www.ist-occasion.org/>.

### 5.1. International Bandwidth


The international connectivity is provided by satellite; the network, called SILK-2, is still being commissioned. It is a VSAT-based network based on a hub in DESY, Hamburg and one node per country. This node is connected directly into DFN and GEANT via the DESY local network. The current bandwidth for the nine Silk countries (those represented by the participants in the workshop) is supposed to be 80 /20 Mbps, where the first number is the down-link capacity. This is scheduled to be increased to 120/30 Mbps. These figures are contractual; the satellite bandwidth ordered by the supplier is on the assumption that there is a substantial (factor of two) compression gain; if the compression gain is not achieved, the supplier will have to order more satellite capacity.

Initially it was intended that all the down-links would be on the same transponder; hence the bandwidth could be shared dynamically (via DVB) amongst all the nodes. Unfortunately, the satellite planned for the service, NSS-8, exploded on the launch-pad. The current satellite used, NSS-7, has more constrained views from the different transponders. For this reason the Caucasian nodes (Armenia, Azerbaijan and Georgia) see one transponder, Turkmenistan a second, and those of the rest of Central Asia (Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan) see a third. Dynamic sharing of capacity is possible only between nodes sharing a single transponder.

During the current commissioning period, there is little compression and only static bandwidth allocation. As a result, the total capacity per country has been deliberately constrained. It varies between about 2/0.5 (Afghanistan) for those with least traffic, to about 9/3 for those with maximum traffic (Uzbekistan). There are other complexities such as Kyrgyzstan does not currently have transmit permission, and Armenia is allowed to include only a very restricted number of locations. Also some countries (e.g. Uzbekistan and Georgia) use other channels in one direction or the other. The allocation per country should go up to an average of 13.3/3.3 Mbps when the system has been fully commissioned; each of the larger countries will be taking significantly more than this average, and statistical multiplexing due to the DVB should further increase the maximum speeds available.

### 5.2. National Connectivity

It is fundamental to the Silk project that each node must be connected to the National Research and Education Network (NREN) in each country. However, the NRENs have reached quite different levels of sophistication in the different countries (cf D2.2 on the OCCASION Web site). At its most widespread, in Azerbaijan, Georgia and Uzbekistan, the NRENs are national in their reach. In Armenia, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan they are still restricted to the city around the Silk node. In Afghanistan, there is no real NREN, not even all

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the University of Kabul is connected yet. However, any statements such as these are quickly outdated. Many initiatives, both national and via NGOs, which are striving to upgrade the NRENs

## 6. Conclusion

Workshops are a key mechanism through which information, knowledge and practical expertise may be transferred to less experienced countries. Workshops enable the capabilities for deployment of advanced networking and raise awareness for dissemination, benchmarking and validation of the research results from IST.

The OCCASION project has an ambitious series of workshops covering many key areas of networking. These include subjects such as: security, setting up NRENs, IP registration, conferencing, IPv6, wireless networking and distance Education. All these workshops are either held in the Silk countries, or support participants from these countries attending the workshops elsewhere. The 6DISS project is limited to IPv6 technology, but provides laboratory-based workshops in many of the emerging areas of the world. Thus to hold this IPv6 workshop in Turkmenistan was perfectly aligned both to the 6DISS and OCCASION objectives.

The overall feedback at the workshop level was very positive, with the majority of the attendees gaining a great deal from the workshop. All participants would recommend the workshop to others, and we expect it to result in continued advancement both of the Internet and of IPv6 in the region. This workshop was different from others held under 6DISS auspices in that there was full funding for the costs of the participants. While this has not been necessary in other 6DISS workshops, particularly when they are co-located with other events, it was essential here. First there was no such co-location; second few people at the working level could attract the funds needed to attend such a workshop.

While there is a latent interest in IPv6 by the NRENs, real deployment will require their having a real need for IPv6-based services. The OCCASION project expects to introduce some IPv6-based conferencing services; these may prove to be the lever to introduce real IPv6 services in the Silk countries.

The impact of the workshop was high in Turkmenistan, with involvement up to the national government level. The knowledge and experience gained will be vital in the continued expansion of the Internet into these frontiers. With continued support the deployed networks will be able to support a wide range of activities in the region.