

# Afghanistan Case Study

## TULIP Findings

Investigation on [www.multinet.af](http://www.multinet.af) lead to some very interesting findings. TULIP algorithm was used to ping the destination from our available landmarks. Though we don't have as many landmarks in Afghanistan as we would like, but the neighboring regions (particularly Pakistan) are well covered. The top three landmarks (ignoring redundancy) with minimum RTT were surprisingly in UK(2) and Russia(1) respectively.

	City	Country	IP Address / Domain	Min RTT	Avg RTT	Max RTT	Loss (%)	Type	Teir	Est. Distance (km)
1	Warrington	United Kingdom	icfamon.dl.ac.uk	149.922	151.014	155.249	0	PingER	0	7496
2	Abingdon	United Kingdom	icfamon.rl.ac.uk	149.961	150.123	150.742	0	PingER	0	7498
3	Abingdon	United Kingdom	icfamon.rl.ac.uk	149.961	150.883	154.538	0	PingER	0	7498
4	Warrington	United Kingdom	icfamon.dl.ac.uk	149.971	150.621	153.214	0	PingER	0	7498
5	Novosibirsk	Russia	rainbow.inp.nsk.su	153.682	155.039	155.610	0.0	PingER	1	7684
6	Vienna	Austria	193.170.94.150	174.474	175.678	176.741	0	PerfSONAR	2	8723
7	Algiers	Algeria	pinger.am.dz	175.650	178.473	180.561	0	PingER	1	8782













Blue markers are selected landmarks and red ius the assumed destination [www.multinet.af](http://www.multinet.af) (kabul)



This makes us wonder about the path through which traffic flows. We did different traceroutes to to find out more.

## Route from UK

Nodes used in traceroute are placed sequentially in order.

IP Address	Country (Short)	Country (Full)	Flag	Region	City	ISP
193.62.127.129	UK	UNITED KINGDOM		ENGLAND	LIVERPOOL	DARESURY LABORATORY
193.63.74.131	UK	UNITED KINGDOM		ENGLAND	LIVERPOOL	DARESURY LABORATORY UK
193.63.74.226	UK	UNITED KINGDOM		ENGLAND	LIVERPOOL	DARESURY LABORATORY UK
193.62.116.18	UK	UNITED KINGDOM		-	-	DARESURY LABORATORY
146.97.42.169	UK	UNITED KINGDOM		-	-	UK ACADEMIC JOINT NETWORK TEAM (NET-JANET-IP)
146.97.33.98	UK	UNITED KINGDOM		-	-	UK ACADEMIC JOINT NETWORK TEAM (NET-JANET-IP)
146.97.33.154	UK	UNITED KINGDOM		-	-	UK ACADEMIC JOINT NETWORK TEAM (NET-JANET-IP)
146.97.35.182	UK	UNITED KINGDOM		SCOTLAND	EDINBURGH	UK ACADEMIC JOINT NETWORK TEAM (NET-JANET-IP)
195.66.224.205	UK	UNITED KINGDOM		ENGLAND	LONDON	LONDON INTERNET EXCHANGE (LINX)
194.186.157.46	RU	RUSSIAN FEDERATION		MOSKVA	MOSCOW	SOVAM TELEPORT
195.239.1.246	RU	RUSSIAN FEDERATION		MOSKVA	MOSCOW	GOLDEN TELECOM RUSSIA MOSCOW
195.69.188.181	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV
195.69.188.126	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV
195.69.190.238	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV
87.237.135.238	DE	GERMANY		-	-	G.I.T. TELECOM LIMITED

\* The last node with IP 87.237.135.238 is identified in Germany though it is not the case.

## Route from Novosibirsk

```

traceroute to 202.86.16.86 (202.86.16.86), 30 hops max, 40 byte packets
 1  c4948-gw (193.124.167.254)  1.1 ms  0.869 ms  0.871 ms
 2  rtc-gw (193.124.167.5)  0.613 ms  0.643 ms  0.633 ms
 3  NSC-FO-c3550-INP.nsc.ru (212.192.189.53)  1.449 ms  0.682 ms  0.664 ms
 4  87.226.228.149 (87.226.228.149)  1.125 ms  1.289 ms  1.711 ms
 5  so-0-0-0.m10-ar2.msk.ip.rostelecom.ru (87.226.139.74)  52.560 ms  52.343 ms  52.777 ms
 6  188.128.90.74 (188.128.90.74)  131.321 ms  131.460 ms  131.126 ms
 7  195.69.188.126 (195.69.188.126)  173.71 ms  129.964 ms  129.817 ms
 8  195.69.190.238 (195.69.190.238)  140.846 ms  140.639 ms  140.404 ms
 9  87.237.135.238 (87.237.135.238)  144.947 ms  145.233 ms  144.836 ms
10  202.86.23.221 (202.86.23.221)  156.192 ms  156.342 ms  156.271 ms
11  ns.af-mail.com (202.86.16.86)  148.380 ms  148.375 ms  146.485 ms



```

IP Address	Country (Short)	Country (Full)	Flag	Region	City	ISP
188.128.90.74	RU	RUSSIAN FEDERATION		-	-	JSC ROSTELECOM
195.69.188.126	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV
195.69.190.238	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV
87.237.135.238	DE	GERMANY		-	-	G.I.T. TELECOM LIMITED
202.86.23.221	AF	AFGHANISTAN		KABOL	KABUL	RUSINFONET INTERNET SERVICE PROVIDER

The important thing to note here is that the main link that connects Kabul to other regions is from Moscow, Russia.

## Links between Neighbors

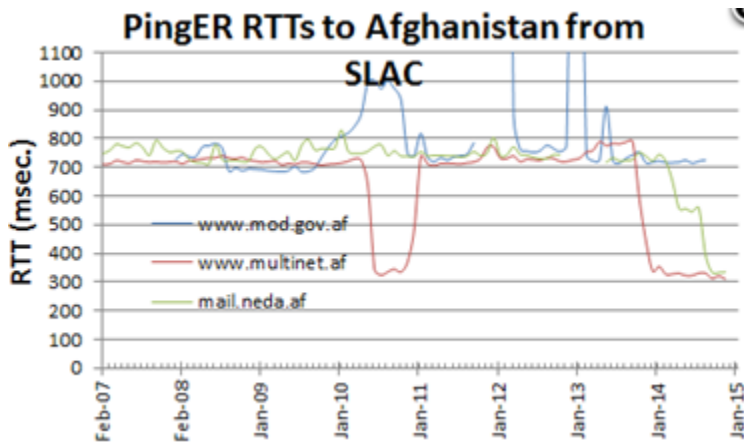
The interesting thing to note here is that even though we have wide coverage of landmarks in Pakistan it's relatively closer from all the other landmarks there is no direct link. A traceroute to [www.multinet.af](http://www.multinet.af) from Rawalpindi, Pakistan followed the following path. Nodes used in traceroute are placed sequentially in order. Again you can see that the route ultimately goes to Moscow.

IP Address	Country (Short)	Country (Full)	Flag	Region	City	ISP	Map
221.120.251.21	PK	PAKISTAN		PUNJAB	RAWALPINDI	ITI	<a href="#">MAP IT!</a>
202.125.128.162	PK	PAKISTAN		SINDH	KARACHI	MASTON ROAD EXCHANGE KARACHI	<a href="#">MAP IT!</a>
195.22.198.57	FR	FRANCE		-	-	TI SPARKLE SEABONE PALERMO POP	<a href="#">MAP IT!</a>
195.22.196.171	IT	ITALY		LAZIO	ROME	TI SPARKLE SEABONE INTERNAL NETWORK	<a href="#">MAP IT!</a>
217.147.129.105	IT	ITALY		-	-	SPRINTLINK IT	<a href="#">MAP IT!</a>
217.147.128.42	IT	ITALY		-	-	SPRINTLINK IT	<a href="#">MAP IT!</a>
213.206.129.126	UK	UNITED KINGDOM		-	-	SPRINTLINK UK	<a href="#">MAP IT!</a>
213.206.129.124	UK	UNITED KINGDOM		-	-	SPRINTLINK UK	<a href="#">MAP IT!</a>
217.147.109.22	DE	GERMANY		-	-	SPRINTLINK DE	<a href="#">MAP IT!</a>
194.186.193.242	RU	RUSSIAN FEDERATION		MOSKVA	MOSCOW	106007 RUSSIA MOSCOW	<a href="#">MAP IT!</a>
195.239.1.246	RU	RUSSIAN FEDERATION		MOSKVA	MOSCOW	GOLDEN TELECOM RUSSIA MOSCOW	<a href="#">MAP IT!</a>
195.69.188.181	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV	<a href="#">MAP IT!</a>
195.69.188.126	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV	<a href="#">MAP IT!</a>
195.69.190.238	UZ	UZBEKISTAN		TOSHKENT	TASHKENT	INTAL TELECOM JV	<a href="#">MAP IT!</a>
87.237.135.238	DE	GERMANY		-	-	G.I.T. TELECOM LIMITED	<a href="#">MAP IT!</a>
202.86.23.221	AF	AFGHANISTAN		KABOL	KABUL	RUSINFONET INTERNET SERVICE PROVIDER	<a href="#">MAP IT!</a>

We can see the path taken is directed from Europe instead of direct route.

## Update Jan 2015

We updated the earlier case study to illustrate the move from GEOS links to terrestrial links for 2 of the 3 hosts PingER monitors in Pakistan. The minimum RTTs measured from SLAC to Afghanistan for these three hosts are shown below. It is seen that in late 2013 and 2014 [www.multinet.af](http://www.multinet.af) and [mail.neda.af](mailto:mail.neda.af) moved to terrestrial links while [www.mod.gov.af](http://www.mod.gov.af) continues to use a GEOS link.



The route from SLAC appears to jump from the Bay Area to Frankfurt, then to Karachi and thence to Afghanistan.



## Conclusion

This information above tells us that adding more infrastructure towards northern region would significantly add to the performance on network connectivity in Afghanistan. On a side note, direct links with neighboring countries can be established to make the regional traffic faster.