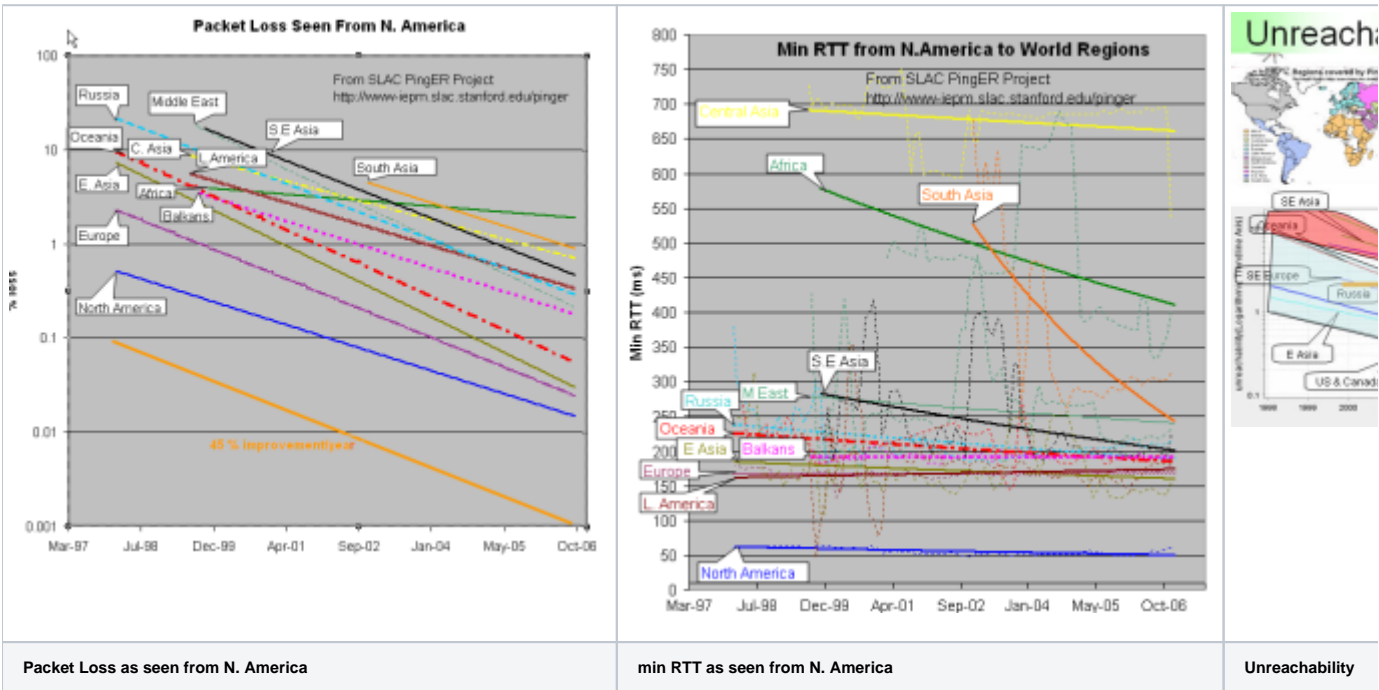


Worldwide Comparison

Before comparing regions of the world it is useful to look at a [World Map of Internet Users](#). This shows that for most the developed world (US and Canada, W. Europe, Japan, Taiwan, S. Korea) typically 40% or more of the people have Internet connectivity while for Africa according to ITU figures for 2004 it is less than 3% and for Sub-Saharan Africa closer to 1.8% and without South Africa 2% closer to 1.3%.



The left hand figure shows the packet loss to various regions of the world as seen from N. America. Since losses are fairly distance independent no attempt has been made to normalize the data. It is seen that the world divides up into two major super-regions: N. America, Europe, E. Asia and Oceania (mainly Australia and New Zealand) with losses below 0.1%, and Latin America, C. Asia, Russia, S.E. Asia, S. Asia and Africa with losses > 0.1% and as high as a few per-cent. All countries are improving exponentially, but Africa is falling further behind most regions.

The second figure from the left shows the drop in the Minimum RTT from 2002-2006. The large step for S. Asia in 2003 was due to the change over from satellite to fibre. Central Asia (also Afghanistan) has hardly moved in its minimum RTT since it continues to use geostationary satellites.

The third figure from the left shows the unreachability of world regions seen from the US. A host is deemed unreachable if all pings of a set fail to respond. It shows the fragility of the link and is mainly distance independent (the reasons for fragility are usually in the last mile, the end site or host). Again the developed regions - US and Canada, E. Asia, and Oceania - have the lowest unreachability (< 0.3%) while the other regions vary from 0.7% to 2%. Africa shows poor statistics and is not improving, where as S. Asia has the second worst results.

The last graph shows the jitter (or variability of RTT) of world regions seen from the US. The jitter is defined as the Inter Quartile Range (IQR) of the Inter Packet Delay Variability ($IPDV_i = RTT_i - RTT_{i-1}$). Jitter is relatively distance independent, it measures congestion, and has little impact on the Web and email. It decides the length of VoIP codec buffers and impacts streaming. We see the usual division into developed versus developing regions.