

Motion charts video narration

This is a Google tool to enable visualizing Internet performance worldwide going back over 13 years. The internet performance measurements come from the PingER project.

Layout of graph:

1. x axis - average Round Trip Time measured to countries of the world from SLAC at Stanford University near San Francisco. We want low Round Trip Times i.e. to the left (but depends on distance)
2. yaxis - throughput in kilobits/sec we want large values (towards the top)
3. Each bubble is a country. Moving the mouse over the bubble identifies the country.
4. Bubble size represents population size
5. Color = region of the world
6. Aggregated by year

Slider

1. Notice the slider at the bottom. Moving this right and left allows moving forward and backward in time from 1998 onwards
2. Notice how the light blue bubble representing China, moves to the left with time, that is the RTT reduced as they shifted from satellite connections to terrestrial connections, and also installed faster links.
3. Notice the throughput also increases with time, this is represented by the bubbles moving upwards.
4. AS time moves forwards more and more bubbles appear as more countries are monitored
5. Moving the mouse over the region causes countries in the region to blink
6. There is a free run feature that automatically flies through time, and shows all the effects of time on network performance for the countries, just like in the movies.

Change axis type

1. There are options to change an axis from a Linear to a Logarithmic scale. These options are labelled Log and Lin
2. To see the data more clearly we can use the Log scale feature. Choosing the Log scale enables us to look at data covering a wide range of values from tens of thousands of kbits/sec to tens of kbits/sec. We can also perform the same spreading using the Log scale on the x-axis for the Round Trip Time
3. ~~Note the correlation between throughput and Round Trip Time~~
4. ~~This is as expected since throughput roughly scales as the inverse of the Round Trip Time~~

Identify countries

1. Move mouse over bubble to identify the country
2. Move mouse over region and hosts in region blink
3. Notice Africa in bottom right hand quadrant of high Round Trip Time and low throughput
4. Track Country via pull down or by clicking on them, say China & India

Change meaning of Axis

1. Many choices including:
 - a. PinGER measurements such as Round Trip Time, throughput, jitter, loss, and
 - b. more development indices such as Human Development Index, Corruption Perception Indexes, ICT development Index
 - c. For example Human Development Index from UN = function of Life expectancy Education & Living standard (GDP/capita). Goes from 0.1 to 1.0. High values are good (to the right)
 - d. Rough correlation, factor of 10 in Internet performance = factor of 2 in HDI
2. Population, Internet users, % of population with internet access usually plot as bubble size, e.g. compare China Internet population with India and with total population. Keep an eye on the sizes of the bubble for India and China. At first they represent the population of the country and are of a similar size. Choosing the bubble size to represent instead the number of Internet users in the country we see the size of the bubble for India reduces dramatically.

Also bar charts

1. Choose bar chart
2. Choose y axis = minimum Round Trip Time
3. Change y axis from logarithmic to Linear
4. Each bar represents a country, color = region etc. and the height of bar represents the minimum Round Trip Time
5. Note the sudden step increase around 400 msec. Countries with minimum RTT > 400msec (i.e. to the left) typically are using geostationary satellites to connect to the outside world.
6. Moving the cursor over the blue africa region box, many African countries blink with large Round Trip Times
7. Moving cursor over countries to the left identifies those with satellite links, African and central Asian countries such as Khirgyzstan & Afghanistan and Cuba