Future PingER Projects

Development

1. **PingER Data Explorer - Joao**
    a. Partially working version is here
    b. Need to add 2014, 2015.
    c. Fix up PingER Motion metrics, if Data Explorer works we do not need this.
        i. documentation is here,
        ii. There is a partially working version that needs files updating here
2. **Fix up Google map of PingER sites. - Joao**
    a. Partially working version is here.
    b. Further extension of the PingER coverage map front end. For example updating to work properly on MSIE and Firefox.
3. **PingER Metrics intensity maps - Joao**
    a. **See here**
4. ~~**Provide support to enable MAs to initiate depositing data at a proxy. This is needed to support the Beijing MA and for Android MAs. See Proxy support for PingER.**~~
5. ~~Coordinate and lead the installation of PingER monitoring at multiple Malaysian sites -- **Saqib**~~
6. Deploy an ePingER at Bario in the Highlands. Also look at deploying a network of PingER monitoring sites in Malaysia.
7. Managing <HostList> for Malaysia from Johari. Since the number of monitoring nodes in Malaysia is likely to grow, I think it is a good idea to start thinking of automated ways of synchronizing the <HostList> section. A few thoughts on this matter:
    a. we can use the same approach as the automatic updating/sync of the Beacon List. This would require modifications to pinger2.pl
    b. which node will be the trusted/root node in Malaysia for updating? since any single monitoring host can add any number of new hosts, might a mechanism to cross-check between monitoring hosts.
8. Extend the NODEDETAILS database to allow entry more carefully validate input.
9. Improve the PingER2 installation procedures to make it more robust. This might be something for the person(s) in Pakistan or UNIMAS who are responsible for installing PingER2 at the Pakistani or Malaysian monitoring sites. Look at the FAQ, and ping_data.pl which has been improved to assist in debugging, could it be further improved. - **Johari**
    a. ~~Build a new makefile (see http://www-iepm.slac.stanford.edu/pinger/tools/pingER-2.0.2.tar.gz) with the latest pinger2.pl and other fixes.~~
10. ~~Migrate PingER to IPv6. Fix PingER archiving/analysis package to be IPv6 conformant. With Malaysia moving quickly to IPv6 (already Nava at USM has sent Les an IPv6 address that he recommends monitoring), converting PingER (especially the gathering, analysis) work with IPv6 is an interesting problem. See Make PingER IPv6 compliant for some thoughts on getting started. **Anjum believes he could provide an undergraduate to start on this, and Adib at UUM is interested. Done by Les.**~~
11. With PingER going back over a decade, its presentation tools tend to be a bit jaded having in some cases been developed in the 90's. New, modern ways to access display and navigate the data would be a big plus. Bebo proposes two projects below. If these are of interest, Bebo is willing to work with students who come to SLAC and remotely with students at UNIMAS and NUST. Bebo believes that both of these areas have great potential for papers within the conference communities with which he is directly involved.
    a. Creative visualization of PingER data including rich interaction;
    b. Publication of PingER data in Linked Open Data formats thereby increasing its usefulness to other researchers. An example is RDF /XML. This could be a development project (as opposed to research) for a final year student. Anjum pointed out that converting the PingER storage mechanism is a major task based on the experience at NUST when they converted te SLAC PingER flat files to a database. On the other hand maybe one could do the conversion on the fly in response to a request. Johari might be able to use some of the funding he received for such a development project (e.g. to enhance pingtable.pl to add this format to its download capabilities). **Th is is being tackled by Renan Souza of UFRJ but not completed.**
12. Network constellation maps.
13. Using Microsoft Geoflow or Google /maps/earth, create a visualization identifying PingER monitored hosts with the size of the dot representing one metric, the color of the dot another metric, and the blink rate the losses. Selection of the monitoring host, metric 1, metric 2, relation between dot size/blink rate and metric value etc. Should be playable in time so selection of time steps.
14. Event detection using RRDs and Holt-Winters.
15. Alerting mechanisms
16. PingER Big data Analytics MD NOR RIDZUAN BIN DAUD <ridzuan@um.edu.my>
17. Distributed Ping Project (DPP), also the DPP web home page
18. Port PingER to Google
19. Mobility and PingER
20. Unify data storage for PingER Raw data
21. Block Chain, Bebo

Research

1. ~~Make a case study on network performance in Malaysia. Consider what you want to learn (e.g. which sites are using VSATs, how direct are connections, how reliable are the connections, which sites are congested, etc.). Identify hosts at representative (e.g. major town and cities, remote areas, educational and commercial network connections) working (i.e. rsepond to pings) sites in Malaysian states.~~
   ~~For comparison could add hosts at sites in Kalimantan, Sabah or other SE Asian countries. Add these to the monitoring site at UNIMAS. Make sure the sites are working. Gather the data for a a couple of months, meanwhile learn how to access the PingER data and use tools such as Excel to perform analysis on the data. Look at who the Internet Service Providers (e.g. by looking at traceroutes, may have to develop or adapt the SLAc tool for gathering traceroutes on a daily or more frequent basis)) are for the sites. Analyze the min RTTs looking for VSATs, look for comparisons (commercial vs A&R sites), look at the traceroutes how direct are the connections (also look at the alpha directivity metrics from PingER). What are the impacts of day vs night weekend vs workday, holidays, are there any other events of interest (earthquakes, cable cuts), route changes.~~
2. Look at anomalous event detection using PingER time series data, based on thresholds and how to extend, maybe adding plateau algorithm. Add as a package to RRD. Also see Anomalous Event Detection that included the Plateau project.
3. There can be a paper about experience with PingER itself if we could find the right conference. MCN, ICC and Globecomm do provide network monitoring topics. It could talk of the various metrics and their importance (in particular; MOS, Alpha, max RTT, min RTT), the lessons learnt from running such a worldwide infrastructure, the uses of the data etc.

4. We can talk of GEO-Location experiences. For example within Pakistan it works fine, however as we go within regions or continents this gets worse. We can publish some stats on that for example. We can add the impact of changing alpha. We can also indicate the importance of landmark proximity.
5. Can we use max ping round trip times or something else to help identify buffer bloat.
6. Mine the PingER data and provide mashups against other Open Link Data sources. See for example: https://confluence.slac.stanford.edu/display/IEPM/Development+Indices+and+PingER
7. ~~Compare pinger2.unimas.my and pinger.unimas.my in terms of hardware, network location and PibgER performance to see if there is a statistical difference. See https://confluence.slac.stanford.edu/display/IEPM/Comparison+of+PinGER+RTTs+from+UNIMAS+monitors+N4+and+RASPBERRY~~