

Requirements for A Power Aware Network

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Background

- Network energy consumption is rising fast
 - Increase of operational cost
 - Ecological impacts
- Reducing energy consumption is desired by network operators
 - Currently most networks are far from energy efficient
- Power-Aware Networking (PANET)
 - Premise: network is not always carrying the peak traffic
 - Adaptively reduce network energy consumption when possible

Requirements for PANET

- Network elements
 - Reducing energy consumption of network elements is the basis of achieving PANET
 - Base energy consumption is usually high
 - Not easy to achieve fully proportional energy consumption, i.e. zero consumption when carry no traffic
- Requirements on network elements
 - should support a set of energy saving modes
 - the transition between different energy modes should be fast, e.g. within subsecond.
 - the transition should not cost too much energy
 - should support the report of energy state and consumption

Requirements for PANET (2)

- Network as a whole
 - Node-specific energy optimization has limitations and not sufficient
 - Node-specific energy saving without coordination may impact services
 - Need to treat the network as a whole and perform global energy optimization
- Requirements on the whole network
 - Network should keep all active network elements with reasonable high utilization, and try to put low utilization elements into energy saving modes
 - Network should retain enough resiliency while perform energy saving
 - Network should meet the QoS level of services while perform energy saving
 - Network should reserve enough spare capacity or be able to react to traffic spikes
 - Network stability should be preserved while performing energy saving
 - Energy saving should not conflict with other network policies

Requirements for PANET (3)

- Network control plane
 - Existing control protocols usually do not consider energy efficiency
 - Existing control protocols may be impacted when network elements enter energy saving mode
- Requirements on control plane
 - support advertising of energy related information
 - coordinate energy saving operations of network elements
 - maximize the opportunity for network elements to save energy
 - be aware of network elements in energy saving modes, take it into consideration of path calculation
 - perform global path calculation/selection for network energy optimization

Requirements for PANET (4)

- Network management plane
 - Necessary for building a Power Aware Network
 - Energy related information monitoring and reporting
 - Works in EMAN cover energy information management of the network elements

Next Steps

- Solicit comments on this requirement draft
- Would also like to discuss the problems and additional requirements of Power Aware Network
- Encourage people to contribute to this work