Requirements for Very Fast Setup of GMPLS LSPs

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Why This Draft?

- IP and optical wide area networks need to support new applications such as data center interconnection, VM migration, grid computing, cloud computing, data visualization, etc.
  - Application characteristics are high-churn large flows that are short in duration, requiring a wavelength or sub-wavelength with very short hold times
  - Requirements include high levels of dynamicity and resiliency, and low connection blocking
  - These requirements cannot be met with the current GMPLS control plane protocol set

Objectives for This Meeting

- Introduce WG to the problem statement
- Get discussion going on list regarding protocol requirements for GMPLS improvements
  - Note that some discussion has already started; private comments received on initial revision of the draft resulted in -01 revision
  - Also need a discussion on the list
- Head towards WG acceptance of work item and this draft

Proposed Requirements

- Requirements in draft divided into Control Plane requirements and Network requirements
- Control Plane requirements would be the basis for future proposals for control plane protocol improvements
- Starting set of control plane requirements (beyond those implied by the application description on slide 2):
  - Protocol extensions must be backward compatible with existing GMPLS control plane protocols
  - Use of GMPLS protocol extensions for this application must be selectable by provisioning or configuration
  - Must support the use of PCE for path computation, and in particular the PCE-based approach for multi-domain LSPs in RFC5441

Network Requirements and Implications

- Network Requirements
  - LSP churn of up to 10 wavelength LSP requests per second network wide and up to 100 sub-wavelength LSPs (e.g., ODUk, L2 virtual circuits) per second
  - LSP setup time less than or equal to 100 ms for intra-continental LSPs, and less than or equal to 250 ms for transcontinental LSPs
  - Minimum LSP holding times of one second
  - Restoration against single link and node failures
  - LSP blocking rate better than 10^{-3}

- Some of the reasons why current GMPLS protocols and procedures cannot meet these requirements include:
  - Stale TE information, and thus increased blocking, due to IGP TE update rate much lower than the required churn rate
  - Real-time path computation (as opposed to pre-planned paths) and PCE communication, i.e., following connection request, thus increasing setup delays
  - Serial signaling processing; for example, Cross-connection procedures resulting in accumulating cross-connection delays when cross-connection must be completed before the Resv signaling message is propagated upstream

Next Steps

- Discussing the draft on the list, especially the proposed requirements for protocol improvements

- WG acceptance of this draft

- Start work on a solution draft to satisfy the protocol improvement requirements