SSO, GR, NSF and NSR

When implementing high availability these four terms are used often. The purpose of this document is to clarify what each of them means and how they work.

SSO (Stateful Switchover)

- This is a Cisco operating mode.
- Device has copied control plane and other state information from the Active Route Processor (RP) to the Standby Route Processor.
- Switchover, as referenced below, will refer to when the Active RP fails and the Standby takes over.

GR (Graceful Restart)

- This is an IETF defined mechanism.
- Refers to communication between routing protocol peers.
- Uses protocol extensions for this communication (e.g. TLVs in IS-IS)
- Communicates a timer or "grace period" to peers.
- **In the event of switchover:** During this grace period, peers will continue to accept and forward packets from the device undergoing the switchover.
- If GR was not used, peers could otherwise withdraw the forwarding information received from the device undergoing the switchover.

NSF (Non-Stop Forwarding)

- FIB and data plane information is copied and maintained on the standby RP.
- **In the event of switchover:** Traffic flows through the device that is undergoing the switchover continue uninterrupted - even if the control plane and routing protocols have not yet converged.
- This is less processor intensive than NSR and often used in conjunction with GR.
- NSR will allow the control plane to restart/reconverge without interrupting data plane forwarding.
- Once the control plane has converged, triggered updates can be utilized to obtain the latest routing information without waiting for protocol and update timers.

NSR (Non-Stop Routing)

- RIB is copied and maintained on the standby RP. Additionally, the information needed to continue the routing protocol peering states is transferred to (or snooped by) the Standby RP.
- **In the event of switchover:** Sequencing to neighboring devices is not dropped – meaning neighborships and peerings will not fall.
- It essentially suppresses routing changes on SSO-enabled peers.
- More resource intensive than when NSF is used with GR.