TR-069 related Requirement for Broadcom 7425 SoC

General Requirement

- The data objects should be stored in a shared area which could be accessible by multiple processes (e.g. shared memory, flash partition).
- High level APIs should be provided to read and update the data objects.
- High level APIs should be thread-safe.

TR-069 implementation

Highlight of TR-069 requirements

- Use Ipv6 for all TR-069 Protocol traffic
- Comply to TR-069 Amendment 3
- Security Requirement
    - TLS (1.2)/SSL based transport for TR-069 on Ipv6
    - TLS SNI (Server Name Identification) Support (Part of TR-069 Amendment 3)
    - CPE uses the “host” portion of the ACS URL to validate the certificate from the ACS.
    - ACS performs IP reverse lookup to verify the identity of the CPE
    - ACS discovery via option 16/17 of DHCPv6 regardless of whether the interface gets IP th
    - CPE should provide a randomized URL to connectionRequest
    - CPE should support ConnectionRequest from ACS for ACS to trigger the CPE to send out Inform request.
    - CPE should be able to change URL, Username, Password based on the ACS's SetParameter RPC request.
- CPE Identity
    - The CPE device must be uniquely identified by <OUI> "-" <ProductClass> "-" <SerialNumber> or <OUI> "-" <SerialNumber> if ProductClass is not present. The serial number should be the same serial number printed on the label attached to the CPE device.
- Transport
    - Ipv6 based transport
    - Support file download using HTTP/HTTPS with Digest based authentication.
    - Support HTTP 1.1 (especially transfer-encode)
- All RPCs should be supported, the following are the ones that are currently used
    - AutonomousTransferComplete
    - AddObject
    - DeleteObject
    - Download

- FactoryReset
- GetParameterNames
- GetParameterValues
- Inform
- Reboot
- RequestDownload
- SetParameterValues
- TransferComplete

TR-135 Data Model

The following data objects and their attributes needs to be implemented.

1. .STBService.{i}.
2. .STBService{i}.Capabilities.
3. .STBService.{i}.Capabilities.FrontEnd.
4. .STBService.{i}.Capabilities.FrontEnd.IP.
    a. StreamingControlProtocols - IGMP, IGMPv2, IGMPv3
    b. StreamingTransportProtocols - UDP
5. .STBService.{i}.Capabilities.PVR.
6. .STBService.{i}.Capabilities.AudioDecoder.
7. .STBService.{i}.Capabilities.VideoDecoder.
8. .STBService.{i}.Capabilities.VideoDecoder.MPEG2Part2.
9. .STBService.{i}.Capabilities.VideoDecoder.MPEG2Part2.ProfileLevel.{i}.
10. .STBService.{i}.Capabilities.VideoDecoder.MPEG4Part2.
11. .STBService.{i}.Capabilities.VideoDecoder.MPEG4Part2.ProfileLevel.{i}.
12. .STBService.{i}.Capabilities.VideoDecoder.MPEG4Part10.
13. .STBService.{i}.Capabilities.VideoDecoder.MPEG4Part10.ProfileLevel.{i}.
14. .STBService.{i}.Capabilities.VideoDecoder.SMPTEVC1.
15. .STBService.{i}.Capabilities.VideoDecoder.SMPTEVC1.ProfileLevel.{i}.
16. .STBService.{i}.Capabilities.AudioOutput.
17. .STBService.{i}.Capabilities.VideoOutput.
18. .STBService.{i}.Capabilities.DRM
19. .STBService.{i}.Capabilities.ServiceMonitoring.
20. .STBService.{i}.Capabilities.AudienceStats.
21. .STBService.{i}.ServiceMonitoring.
22. .STBService.{i}.ServiceMonitoring.MainStream.{i}.
23. .STBService.{i}.ServiceMonitoring.MainStream.{i}.Total.
24. .STBService.{i}.ServiceMonitoring.MainStream.{i}.Total.DejitteringStats.
25. .STBService.{i}.ServiceMonitoring.MainStream.{i}.Total.MPEG2TSStats.
26. .STBService.{i}.ServiceMonitoring.MainStream.{i}.Total.VideoDecoderStats.
27. .STBService.{i}.ServiceMonitoring.MainStream.{i}.Total.AudioDecoderStats.
28. .STBService.{i}.Components.
29. .STBService.{i}.Components.AudioDecoder.{i}.
30. .STBService.{i}.Components.VideoDecoder.{i}.
31. .STBService.{i}.Components.AudioOutput.{i}.
32. .STBService.{i}.Components.VideoOutput.{i}.
33. .STBService.{i}.Components.SPDIF.{i}.

34. .STBService.{i}.Components.HDMI.{i}.
35. .STBService.{i}.Components.HDMI.{i}.DisplayDevice
36. .STBService.{i}.Components.DRM.{i}.
37. .STBService.{i}.Components.FrontEnd.{i}.
38. .STBService.{i}.Components.FrontEnd.{i}.IP.
39. .STBService.{i}.Components.FrontEnd.{i}.IP.IGMP.
40. .STBService.{i}.Components.FrontEnd.{i}.IP.IGMP.Client-Group.{i}.
41. .STBService.{i}.Components.FrontEnd.{i}.IP.IGMP.Client-GroupStats.{i}.
42. .STBService.{i}.Components.FrontEnd.{i}.IP.IGMP.Client-GroupStats.{i}.Total
43. .STBService.{i}.Components.FrontEnd.{i}.IP.IGMP.Client-GroupStats.{i}.CurrentDay
44. .STBService.{i}.Components.FrontEnd.{i}.IP.IGMP.Client-GroupStats.{i}.QuarterHour.
45. .STBService.{i}.Components.FrontEnd.{i}.IP.Dejittering.
46. .STBService.{i}.Components.FrontEnd.{i}.IP.Inbound.{i}.
47. .STBService.{i}.Components.FrontEnd.{i}.IP.Outbound.{i}.
48. .STBService.{i}.Components.PVR.
49. .STBService.{i}.Components.PVR.Storage.{i}. - Definitely need more detailed information here... TR-140 in UNO-Lite will provide that.
50. .STBService.{i}.AVStreams.
51. .STBService.{i}.AVStreams.AVStream{i}. - We won't know the Outbound correlation; but the others we should know
52. .STBService.{i}.AVPlayers.
53. .STBService.{i}.AVPlayers.AVPlayer.{i}.
54. .STBService.{i}.ServiceMonitoring.
55. .STBService.{i}.ServiceMonitoring.MainStream.{i}.Sample.VideoResponseStats.
56. .STBService.{i}.ServiceMonitoring.MainStream.{i}.Sample.HighLevelMetricStats.
57. .STBService.{i}.Applications.
58. .STBService.{i}.Applications.AudienceStats.
59. .STBService.{i}.Applications.AudienceStats.Channel.{i}.

Broadcom provides storage for all above objects. Object 1 through 30 is expected to be updated by Broadcom SDK. Object 31-53 will be updated by Google SageTV media player software.

The SageTV media player prefers a periodic polling model. The application layer (e.g. SageTV Media Player Software) provides callback which will be called on a polling interval or when an on-demand update is required for support reasons).
Broadcom will supply an API library to support the above polling model.

Pseudo API

- void subsysInit(TRPollCallback); // Initialize the TR-69 subsystem, e.g. create timer thread for counting down polling interval, and set the callback for updating the counters.
- void setPollingPeriod(long value); // set the polling period in ms.
- void setParameter (String name, Type type, void* value); // value could be String, int, boolean...
- (void) (*TRPollCallback) (TypeOfUpdate type); // The parameter of this callback provides information about whether the callback is called because of periodic polling or onDemandUpdate.
- void registerForParameterChange(TRPushCallback, String name); // sets a callback function for when the specified parameter has a change pushed down

- (void) (*TRPushCallback) (String name, Type type, void* value); // called when a parameter change is pushed down

TR-181 Data Model

Based on TR-181 Issue2 Amendment 4, the following data objects and their attributes needs to be implemented.

- Device.DeviceInfo
- Device.DeviceInfo.VendorConfigFile.{i}.
- Device.DeviceInfo.SupportedDataModel.{i}.
- Device.DeviceInfo.MemoryStatus.
- Device.DeviceInfo.ProcessStatus.
- Device.DeviceInfo.ProcessStatus.Process.{i}.
- Device.DeviceInfo.TemperatureStatus.
- Device.DeviceInfo.TemperatureStatus.TemperatureSensor.{i}.
- Device.DeviceInfo.NetworkProperties.
- Device.DeviceInfo.Processor.{i}.
- Device.DeviceInfo.VendorLogFile.{i}.
- Device.DeviceInfo.ProxierInfo.
- Device.ManagementServer.
- Device.ManagementServer.ManageableDevice.{i}.
- Device.ManagementServer.AutonomousTransferCompletePolicy.
- Device.ManagementServer.DownloadAvailability.
- Device.ManagementServer.DownloadAvailability.Announcement.
- Device.ManagementServer.DownloadAvailability.Announcement.Group.{i}.
- Device.ManagementServer.DownloadAvailability.Query.
- Device.ManagementServer.DUStateChangeComplPolicy.
- Device.ManagementServer.EmbeddedDevice.{i}.
- Device.ManagementServer.VirtualDevice.{i}.
- Device.MoCA.
- Device.MoCA.Interface{i}.
- Device.MoCA.Interface{i}.Stats.
- Device.MoCA.Interface{i}.QoS.
- Device.MoCA.Interface{i}.QoS.FlowStats.{i}.
- Device.MoCA.Interface{i}.AssociatedDevice.{i}.
- Device.WiFi
- Device.WiFi.Radio.{i}.
- Device.WiFi.Radio.{i}.Stats.
- Device.WiFi.Radio.{i}.Antenna.
- Device.WiFi.SSID.{i}.
- Device.WiFi.SSID.{i}.Stats.
- Device.WiFi.AccessPoint.{i}.
- Device.WiFi.AccessPoint.{i}.Accounting.
- Device.WiFi.AccessPoint.{i}.Security.
- Device.WiFi.AccessPoint.{i}.WPS.
- Device.WiFi.AccessPoint.{i}.AssociatedDevice.{i}.
- Device.WiFi.EndPoint.{i}.
- Device.WiFi.EndPoint.{i}.Stats

- Device.WiFi.EndPoint.{i}.Security
- Device.WiFi.EndPoint.{i}.Profile.{i}.
- Device.WiFi.EndPoint.{i}.Profile.{i}.Security.
- Device.WiFi.EndPoint.{i}.Profile.{i}.WPS.
- Device.Bridging.
- Device.Bridging.Bridge.{i}.
- Device.Bridging.Bridge.{i}.Port.{i}.
- Device.Bridging.Bridge.{i}.Port.{i}.Stats.
- Device.Bridging.Bridge.{i}.VLANPort.{i}.
- Device.Ethernet.
- Device.Ethernet.RMONStats.{i}.
- Device.Ethernet.Interface.{i}.
- Device.Ethernet.Interface.{i}.Stats.
- Device.Ethernet.Link.{i}.
- Device.Ethernet.Link.{i}.Stats.
- Device.IP.Interface.{i}.
- Device.IP.Interface.{i}.IPv4Address.{i}.
- Device.IP.Interface.{i}.IPv6Address.{i}.
- Device.IP.Interface.{i}.IPv6Prefix.{i}.
- Device.IP.Interface.{i}.Stats.{i}.
- Device.IP.ActivePort.{i}.
- Device.IP.Diagnostics.IPPing.
- Device.IP.Diagnostics.TraceRoute.
- Device.IP.Diagnostics.TraceRoute.RouteHops.{i}.
- Device.IP.Diagnostics.DownloadDiagnostics.
- Device.IP.Diagnostics.UploadDiagnostics.
- Device.IP.Diagnostics.UDPEchoConfig.
- Device.QoS.
- Device.QoS.Classification.{i}.
- Device.QoS.App.{i}.
- Device.QoS.Flow.{i}.
- Device.QoS.Policer.{i}.
- Device.QoS.Queue.{i}.
- Device.QoS.QueueStats.{i}.
- Device.QoS.Shaper.{i}.
- Device.USB.
- Device.USB.Interface.{i}.
- Device.USB.Interface.{i}.Stats.
- Device.USB.Port.{i}.
- Device.USB.USBHosts.
- Device.USB.USBHosts.Host.{i}.
- Device.USB.USBHosts.Host.{i}.Device.{i}.
- Device.USB.USBHosts.Host.{i}.Device.{i}.Configuration.{i}.
- Device.USB.USBHosts.Host.{i}.Device.{i}.Configuration.{i}.Interface.{i}.