TROL

TR-069 Client Software

What is TR-069

TR-069 is a BroadBand Forum (former DSL Forum) technical specification which defines an application layer protocol for remote management of customer-premises equipment (CPE).

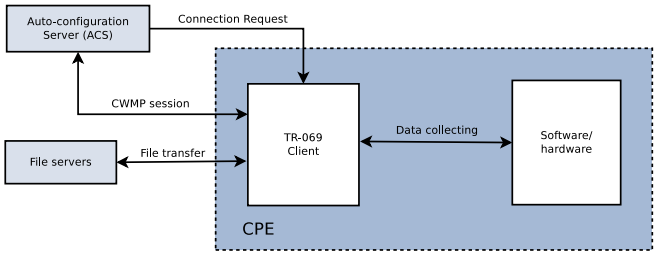

Figure 1: TR-069 data flow

For more information see TR-069: CPE WAN Management Protocol.

Why do you need TR-069 support

- Centralized scalable management system
- Possibility to manage a wide variety of residential gateways and other network devices (STB, NAS etc.) in the same way
- CPE devices located behind NAT
- Ability to track changes on CPE devices
- Unified and scalable method of software upgrade
- Vendor-specific management methods and configuration parameters

For more information see MR-230: TR-069 Deployment Scenarios.

TROL

TROL is a product which includes:

- TR-069-compliant client application
- Set of libraries to simplify integration with customer software and hardware
- Tools for data model description files handling

Complied standards

- TR-069: CPE WAN Management Protocol v1.1
- TR-098: Internet Gateway Device Version 1.1 (Data Model for TR-069)
- TR-104: Provisioning Parameters for VoIP CPE
- TR-106: Data Model Template for TR-069-Enabled Devices
- TR-111: Applying TR-069 to Remote Management of Home Networking Devices
- TR-135: Data Model for a TR-069 Enabled STB
- TR-140: TR-069 Data Model for Storage Service Enabled Devices
- TR-142: Framework for TR-069 enabled PON devices
- TR-143: Enabling Network Throughput Performance Tests and Statistical Monitoring
- TR-157: Component Objects for CWMP
- TR-181: Device Data Model for TR-069

TR-069 features in TROL

- Software update (firmware download)
- CPE RPC Methods
  - GetRPCMethods
  - GetParameterNames
  - GetParameterValues, SetParameterValues
  - GetParameterAttributes, SetParameterAttributes
  - AddObject, DeleteObject
  - Upload, Download, GetAllQueuedTransfers
  - Reboot, FactoryReset
- ACS RPC Methods
  - Inform
  - TransferComplete
- Vendor-specific parameters definition and access
- TCP/UDP Connection requests, integrated STUN
- SSL connections
- HTTP/HTTPS/FTP file transfer
- Diagnostics

TROL benefits

- Design flexibility; no efforts needed to add customer-specific features
- Tunable footprint and RAM usage
- Modularity
  - Multiple data providers each responsible for management of certain hardware or software component
  - Flexible logic allows to combine data providers and shape a customer device data model
  - Data providers can be reused across customer product line
- Internal memory management to speed up allocations and secure memory usage
- Debug mode with run-time validation of all data structures
- Both ACS and providers data validation according to the datamodel specification (type checking, value range, size)
- Run-time modules addition/removal
- Active and passive notifications, diagnostics, periodic Informs
- Integrated file transfer support (HTTP, HTTPS, FTP)
- Strong debug capabilities including CLI interface for precise client control
- Uses Broadband Forum XML data model description
- Ready-to-use data provider for constant values

Components

- Application Core is responsible for application initialization, shutdown, configuration files processing, internal events and commands dispatch
- HTTP Server handles TCP/UDP Connection Requests
- CWMP Session manager provides support for CWMP protocol, RPC, Events and periodic Informs
- Transfer Manager performs files upload and download
- IPC Manager provides debug interface for communication with external applications such as CLI
- Data Providers are responsible for interaction with customer hardware or software; each is responsible for a set of TR-069 management variables or subtrees
- Data Model Manager performs communication with data providers, generates notifications and performs providers data validation
- Persistent Storage Manager reads and stores software/firmware images and configuration files into persistent memory, e. g. flash

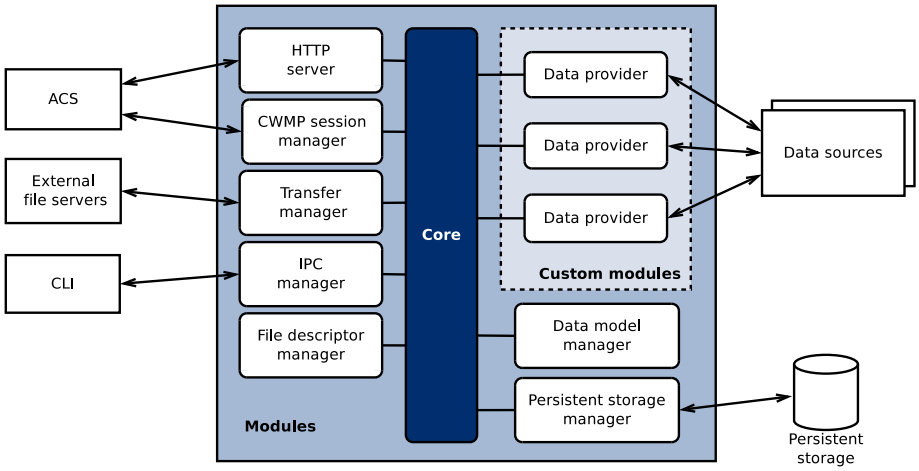

Figure 2: TROL components

Portability

- Written in ANSI C
- Single-threaded
- Build system is based on GNU autotools
- Utilize POSIX API (sockets, file access)
- Can run on Linux, FreeBSD, NetBSD, MacOS X, QNX
- Dependencies are libc (uClibc, glibc), OpenSSL (optional), libfetch or libcurl, expat

Provided services

- TROL porting to customer platforms
- Integration of TROL with customer's software
- Validation of customer product for compliance with TR-069 standard

Roadmap

- Support TR-069 Amendment 4 features
- SFTP and TFTP file transfer
- Multicast file transfer

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