

MFD CWMP BOF

October 4, 2011

Cupertino, CA

PWG F2F Meeting

Agenda



- CWMP Functional Overview
- Why use CWMP for MFDs/Printers?
- Benefits of CWMP for MFDs/Printers
- Proposed Activities
- Collaboration Approach
- Status
- Review the Whitepaper
- Next Steps
- Supplement
 - CWMP Functional Overview – more details

CWMP Functional Overview



- CWMP (CPE WAN Management Protocol) is a Broadband Forum standard (TR-069) that defines a set of WAN management interfaces between an Auto-configuration Server (ACS) and a collection of CWMP-enabled CPEs (Customer Premise Equipments).
- CWMP supports service contract based **remote** and **secure** management and provisioning of CPEs *throughout their entire lifecycle* – **deployment, installation, management, and support**.
- CWMP supported functionality via ACS includes:
 - Auto-configuration and dynamic provisioning of CPEs and services
 - Software/firmware image management
 - Software module management
 - Status and performance monitoring
 - Diagnostics execution and reporting
 - Standard interfaces to business applications (e.g. OSS/BSS/CRM), policy servers, call centers, etc.
 - Strong security - transaction confidentiality and data integrity

CWMP Overview – cont'd

CWMP in an End-to-End Management Architecture

The following figure places TR-069 in the end-to-end management architecture:

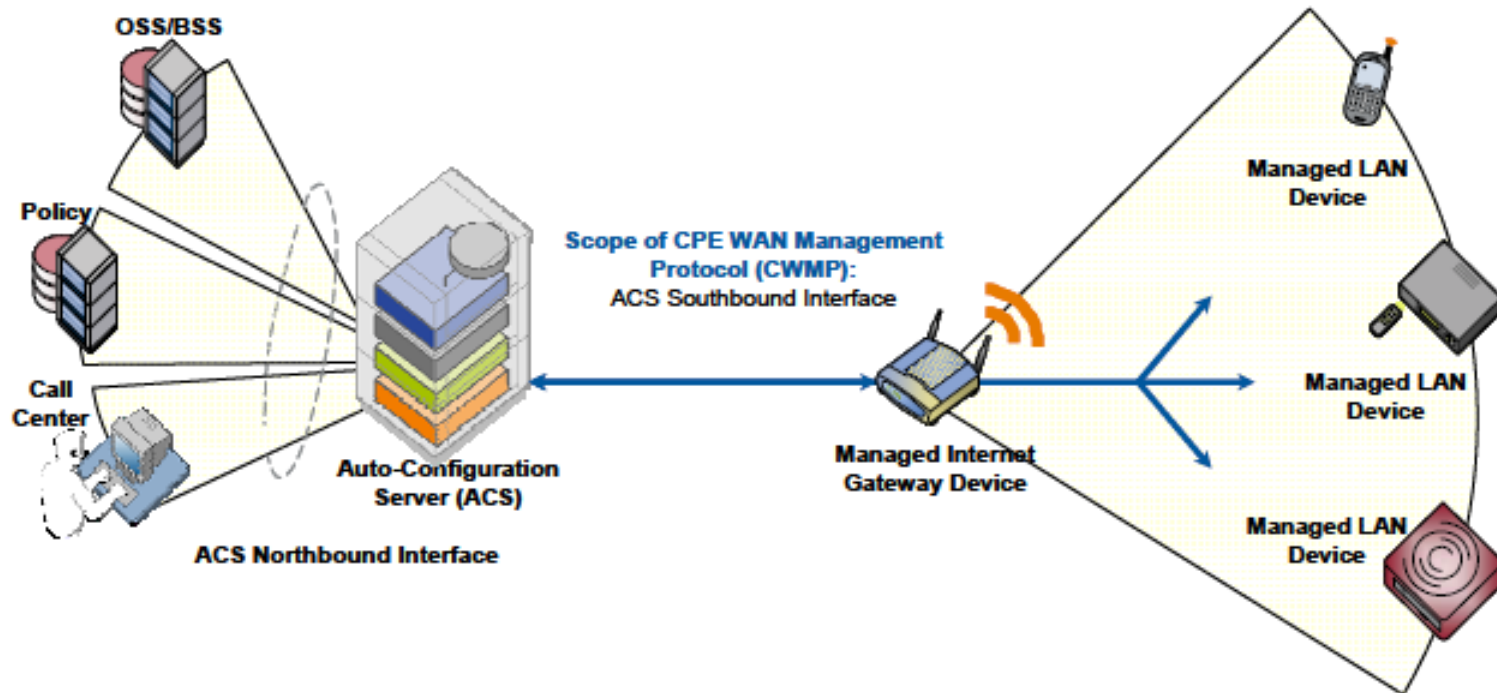


Figure 1 – Positioning in the End-to-End Architecture

- Note 1: Above figure is copied “verbatim” from the BBF CWMP (TR-069)
- Note 2: CWMP-managed LAN on right could be a **home, SOHO, SMB, or enterprise** LAN

CWMP Overview – cont'd

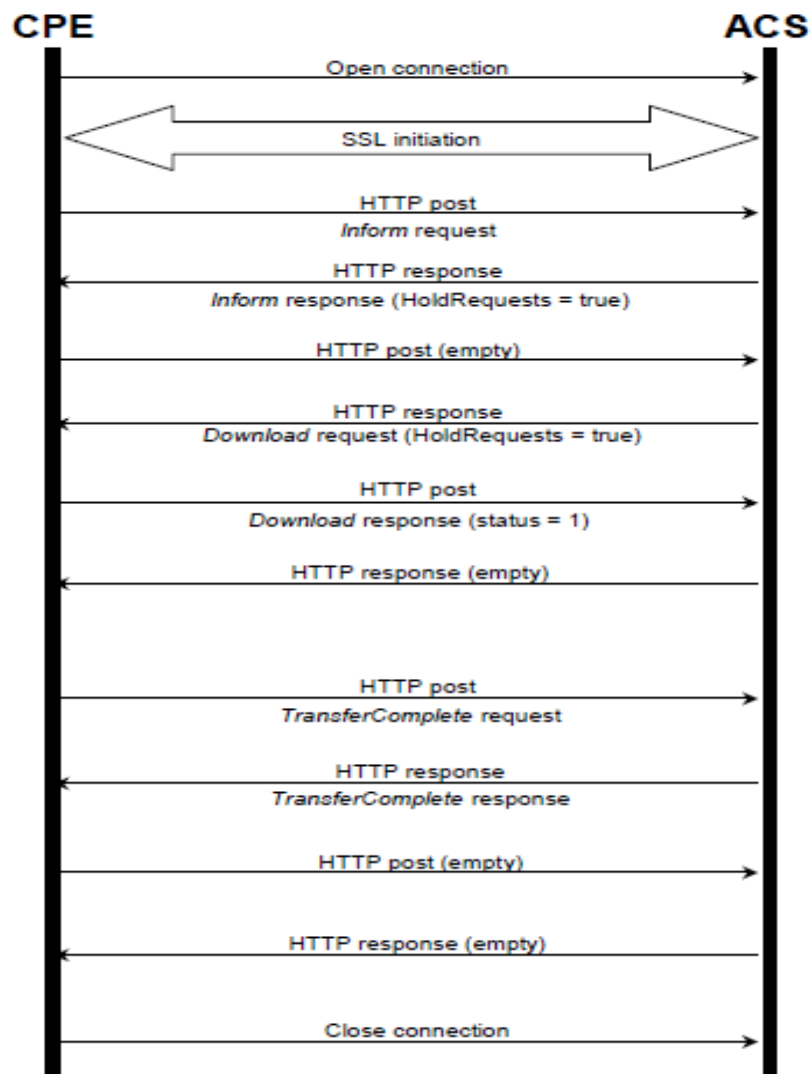
- Protocol message exchange: SOAP over HTTP 1.1
- Security Mechanisms
 - TLS 1.2 or higher is RECOMMENDED
 - Alternative authentication using shared secrets via HTTP is also supported for lower security environments
- Data Model
 - Data hierarchy
 - Root object: “Device” – common objects (in TR-181)
 - components (in TR-143 & 157)
 - single “Services” object
 - Each Service Object – objects
 - sub-objects
 - parameters
 - Object Versioning – two integers (ObjectName:Major.Minor)
 - Profiles – define conformance requirements for objects

CWMP Overview – cont'd

Figure 4 – Example with the ACS using HoldRequests equal true

- An example CWMP protocol exchange sequence
 - ACS initiates a short file download, and CPE sends a TransferComplete later in the same session
 - This happens in parallel when CPE still performing on-going CWMP session - hence ACS needs to set HoldRequests to true until it has completed sending all requests to the CPE

*Note: Figure 4 is copied
"verbatim" from BBF TR-069.



Why use CWMP for MFDs/Printers?



- In recent years the telecom industry and IT MSPs have migrated to using CWMP to remotely and securely manage and provision all kinds of devices in home, SOHO, SMB, and enterprise environments based on service contracts
- Routers, bridges, cable modems, DSL modems, and Internet/residential gateways, set-top boxes, IP phones, cell phones, storage devices, PCs and laptops, etc
- Having a standard CWMP data model for MFDs and imaging services is important – to ensure interoperability of all CWMP-based solutions across all MFD products
- Devices supporting CWMP-based management must implement:
 - A set of standard interfaces between ACS and all CPEs
 - CWMP device data model to expose device/service info to ACS

Benefits of CWMP for MFDs/Printers



- Enables Telecom and IT MSPs (Managed Service Providers) to include MFDs/printers into their service offerings.
- Enables MPS (Managed Print Service) providers to include mainstream IT devices into their service offerings.
- CWMP serves as a common protocol to simplify remote administration and problem resolution for both customers and service providers.
- Customer benefits since they are no longer locked into one vendor for their IT devices.
- Advanced remote management capabilities help reduce service dispatch and other customer support costs.

Proposed Activities



- Write a PWG whitepaper that:
 - Provides rationale for developing a standard CWMP data model for MFDs and printers: use cases, technical requirements
 - Proposes guidance for remote management of MFDs and printers via CWMP
 - Proposes guidance for CWMP Proxy implementations that communicate with MFDs and printers using their native IPP, SNMP, and/or web services, e.g., PWG Scan Service
 - Proposes a data model for MFDs and printers, with an XML definition, that is based on Broadband Forum Data Model Template for TR-069-Enabled-Devices (TR-106)
 - **A machine translation from the PWG Semantic Model**
- BBF members (from PWG and others) should propose a new project, chartered by Broadband Forum (BBF), to develop the new standard CWMP data model for MFDs and printers (TR-xxx)

Collaboration Approach



- Interested PWG participants closely collaborate with Thinxstream team -
 - Regular (weekly or bi-weekly) BOF calls at 9am US Eastern on Friday (to allow participation by Bangalore engineers)
 - Regular whitepaper updates to document technical progress
 - Architecture and pseudo-code for machine translation tool
- Current weekly teleconference participants –
 - PWG: McDonald (Samsung), Nancy Chen (Oki Data)
 - **Others are welcome!**
 - Thinxstream team: Ranga Raj (CTO), Anil Takkar (Product Manager), Laxman Bhat, Subramanyan Krishnan, Nagaraj Ghatigar

- PWG-Thinxstream team held teleconferences on Friday September 9, 16, 23
- Initial whitepaper was reviewed on September 16, 23
- Main use cases & deployment scenarios are mostly complete – thanks for lots of inputs from Thinxstream
- Developed an approach for converting PWG Semantic Model XML schema to CWMP data model for MFD:
 - CWMP data models are XML documents that conform to BBF structural hierarchy (model, component, object, parameter)
 - Parameters must use the BBF defined datatypes which are a restricted subset of XML standard datatypes
 - PWG Semantic Model is XML schema that can use XML standard datatypes, with or without restrictions – CWMP changes:
 - Choices need to be flattened to simple types
 - Complex types need to be converted to objects/sub-objects

Status – cont'd

- Use Cases
 - MFDs managed by telecom providers
 - MFDs managed by MPS providers
 - MFDs managed by enterprise IT staff
 - Print Kiosks managed by telecom providers
- We will review the details of these use cases in the whitepaper today

Status – cont'd



- Current approach to converting the PWG SM XML data model to a BBF data model for MFDs –
 - 1) Define translation rules for PWG complex datatypes and element groups
 - 2) Machine-translate all PWG SM XML schema well known values and datatypes into control files for the tool
 - 3) Machine-translate the entire PWG SM XML schema into the equivalent BBF model/object/sub-object/parameter statements, with BBF parameters mapped one-to-one from PWG SM simple XML elements.
 - 4) Hand-edit machine-translated CWMP data model to fix artifacts and add XML documentation (e.g., PWG SM mapping notes)
 - **Thinxstream software team has graciously volunteered to develop a machine-translation tool**
 - **Ira, Nancy, and perhaps others (?) to ensure the closest mapping from the PWG semantic model XML schema**
- **Any suggestion for a better approach?**

Whitepaper Review

- “Broadband Forum CWMP MFD Data Model”:
<ftp://ftp.pwg.org/pub/pwg/BOFs/cwmp/white-cwmpmfd10-20110926.pdf>

Discussion

- Is collaboration simply through weekly/bi-weekly teleconferences and PWG BOFs acceptable?
- If not, which PWG working group should host this project?
 - MFD ?
 - WIMS ?

Next Steps

- Continue weekly/bi-weekly teleconferences with PWG-Thinxtream team
 - Review and update the whitepaper
 - Report status in the next BOF at December face-to-face meeting

Supplements

CWMP Functionality



- Auto-configuration and Dynamic Service Provisioning
 - At the time of CPE connection
 - Re-provision and re-configure at subsequent time
 - Asynchronous ACS-initiated re-provisioning
 - Based on the requirements of a specific CPE or on collective criteria, e.g. vendor, model, software version, etc.
 - Straightforward future extensions
- Software/firmware image management
 - ACS initiated and optional CPE initiated download of img file
 - Version identification
 - Notification of download success/failure

CWMP Functionality – cont'd

- Software module management
 - Install, update, uninstall software modules in CPE
 - Notify ACS of success/failure
 - Start and stop applications
 - Enable/disable execution environment
 - Inventory software modules available
- Status and performance monitoring
 - CPEs make information available to ACS for monitoring
 - ACS monitors CPE's status and performance statistics
 - CPE actively notifies ACS of change to CPE state

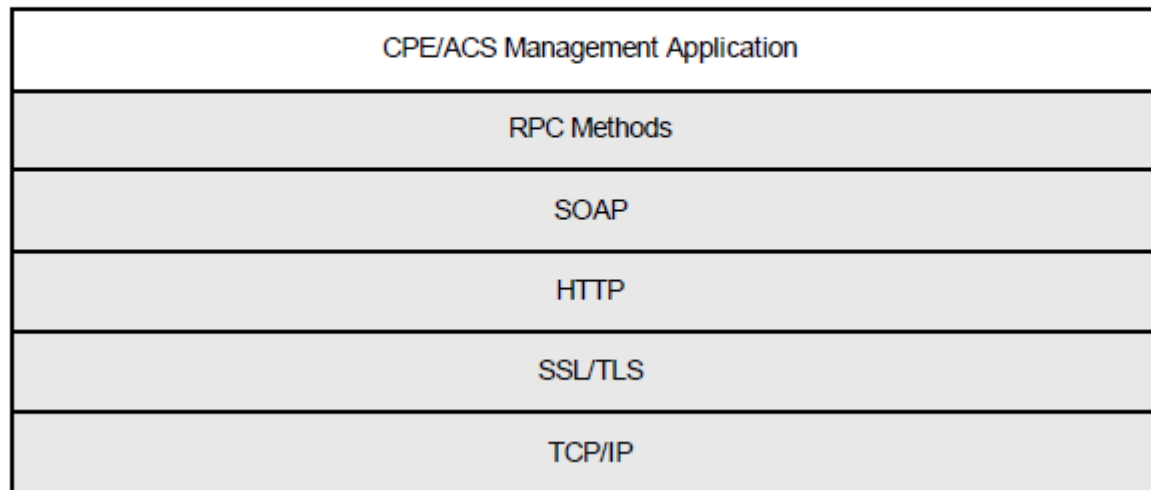
CWMP Functionality – cont'd

- Diagnostics reporting
 - CPEs make information available to ACS for diagnostics
 - ACS diagnoses and resolves CPE's connectivity/service issues
 - ACS instructs CPEs to execute defined diagnostic tests
- Standard interfaces to operational/business support systems, policy servers, and call centers for:
 - Order fulfillment
 - Billing
 - Subscriber management
 - Change management
 - Manufacturer management
 - Service level agreement management
 - Performance analysis

CWMP Functionality – cont'd

- Protocol Stack Requirements

Figure 2 – Protocol stack



*Note: Figure 2 above is copied “verbatim” from BBF CWMP (TR-069)

CWMP Functionality – cont'd



- Security Mechanisms
 - Use TLS/1.2 for secure transport between CPE and ACS (RECOMMENDED)
 - Provides transaction confidentiality, data integrity
 - Supports certificate-based authentication of CPE and ACS
 - Alternative authentication in HTTP layer between the CPE and ACS – based on shared secrets