

CWMP BOF

December 6, 2011

Austin, TX

PWG F2F Meeting

Agenda



- CWMP Overview
- Why use CWMP for Printers/MFDs?
- Collaboration Approach
- Activities
- Status
- Review the Whitepaper
- Next Steps
- Supplement
 - CWMP Overview – more details
 - Benefits of CWMP for Printers/MFDs
 - CWMP Functionality
 - Celstream's Print Service Attribute Table

CWMP 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 set 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 supports all of the following functionality via an ACS:
 - Auto-configuration and dynamic provisioning of CPEs and services
 - Software/Firmware image management of CPEs
 - Software module management of services
 - Status and performance monitoring of CPEs and services
 - Diagnostics execution and reporting of CPEs
 - Standard interfaces to policy servers, call centers, and business applications (e.g. OSS/BSS/CRM)
 - Strong security – transaction confidentiality and data integrity

CWMP Overview– cont'd

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

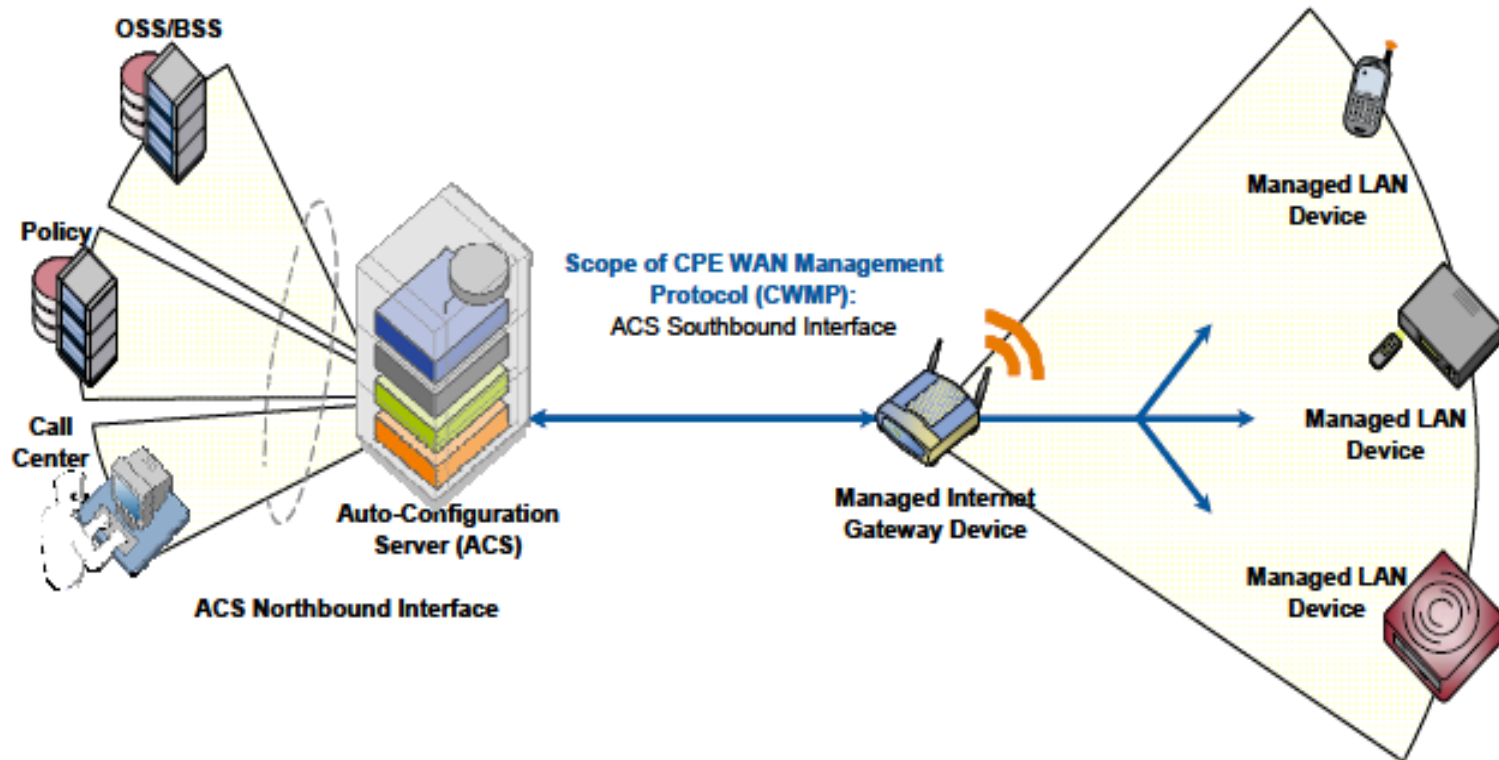


Figure 1 – Positioning in the End-to-End Architecture

- Standard interfaces to policy servers, call centers, and business applications (e.g. OSS/BSS/CRM)
- Strong security – transaction confidentiality and data integrity

Why use CWMP for Printers/MFDs?



- 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
- CWMP is supported in routers, bridges, cable modems, DSL modems, and Internet/residential gateways, set-top boxes, IP phones, cell phones, storage devices, PCs and laptops
- Standard CWMP data models for Printers and MFDs are important – to ensure interoperability of all CWMP-based solutions across all imaging products
- Devices supporting CWMP-based management must implement:
 - A set of standard interfaces between ACS and all CPEs
 - CWMP device data model(s) to expose device/service info to ACS

Collaboration Approach



- PWG and Thinxtream participants collaborate closely
 - CWMP BOF calls at 8am US PST 11am US EST on Friday roughly bi-weekly (w/ participation of Bangalore engineers)
 - CWMP whitepaper updates to document technical progress
 - Architecture and pseudo-code for machine translation tool
 - New focus – Printer data model for first phase
- Current CWMP BOF participants
 - PWG: Ira McDonald (Samsung), Nancy Chen (Oki Data), Bill Wagner (TIC)
 - **Others are welcome!**
 - Thinxtream: Ranga Raj (CTO), Anil Takkar (Product Manager), Laxman Bhat, Subramanyan Krishnan, Nagaraj Ghatigar

- Current – PWG Whitepaper
 - Rationale for developing standard CWMP data models for Printers and MFDs: use cases, technical requirements
 - Guidance for remote management of Printers and MFDs via CWMP
 - Guidance for CWMP Proxy implementations that communicate with Printers and MFDs using their native IPP, SNMP, web services (e.g., PWG Print Service), etc.
 - Data model for Printers in first phase, based on the BBF Data Model Template for TR-069-Enabled-Devices (TR-106)
 - **A machine translation of the PrintService from PWG SM**
 - Data model for MFDs *deferred* to second phase (due to lack of standards deployment in current products – prevents proxies)
- Future – BBF CWMP Data Model for Printers (TR-xxx)
 - BBF members (from PWG) should propose a new BBF project

- CWMP BOF team teleconferences on Fridays from September through November
- CWMP whitepaper revised – Printers in first phase
- CWMP use cases & deployment scenarios complete – thanks for lots of input from Thinstream
- Developed an approach for converting PWG SM XML schema to CWMP XML instance data models:
 - 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/unions may need to be flattened to simple types
 - Complex types need to be converted to objects/sub-objects

Status – cont'd



- Current approach for BBF data model for Printers
 - 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 PrintService subtree of the 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)
 - **Thinstream software team considering the development of a machine-translation tool**
 - **Ira, Nancy, Bill, and perhaps others (?) to ensure the closest mapping from the PWG semantic model XML schema**

Whitepaper Review

- “CWMP Data Models for Printers and MFDs”:
<ftp://ftp.pwg.org/pub/pwg/BOFs/cwmp/white-cwmpmfd10-20111205.pdf>

Next Steps

- Continue CWMP BOF teleconferences
 - Review and update the whitepaper
 - Report status in the next BOF at February face-to-face meeting

Supplements

CWMP Overview



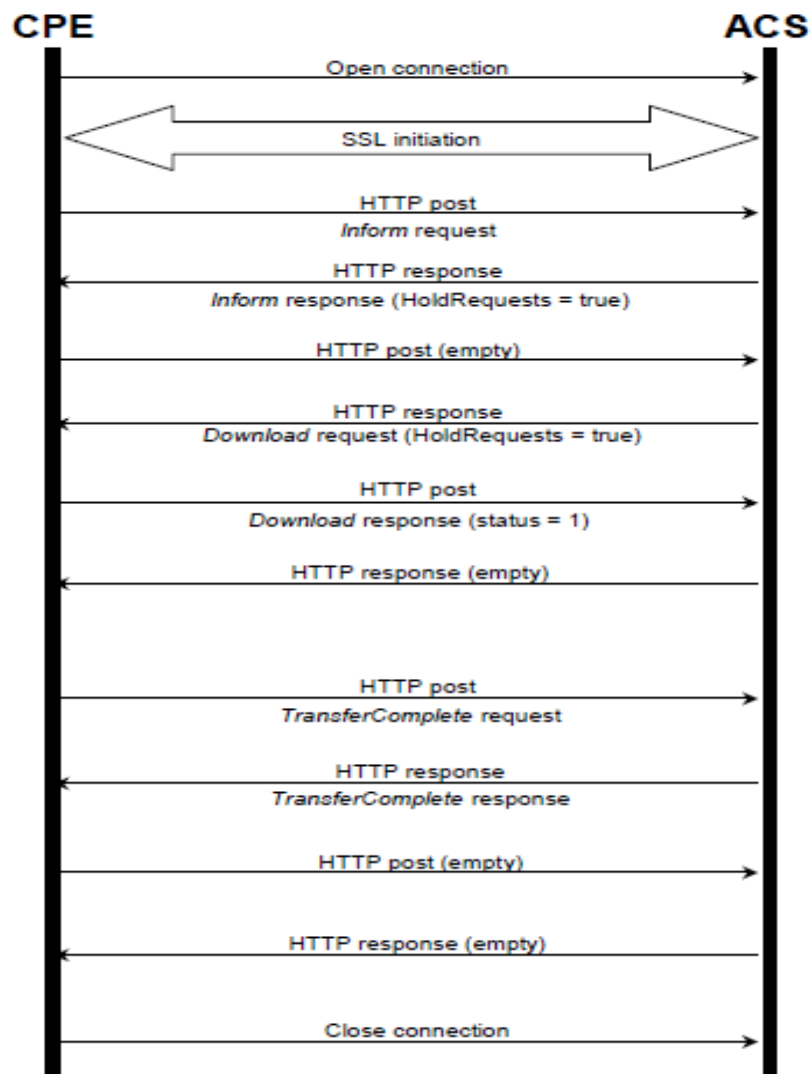
- Protocol message exchange: SOAP over HTTP 1.1
- Security Mechanisms
 - TLS 1.2 or higher is RECOMMENDED
 - Alternative authentication using shared secrets via HTTP is also supported for lower security environments
- Data Model
 - Data hierarchy
 - Root object: "Device" – common objects (in TR-181)
 - 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.



Benefits of CWMP for Printers/MFDs



- Enables Telecom and IT MSPs (Managed Service Providers) to include Printers/MFDs in their service offerings.
- Enables MPS (Managed Print Service) providers to include mainstream IT devices in their service offerings.
- CWMP serves as a common protocol to simplify remote administration and problem resolution for both customers and service providers.
- Customers benefit 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.

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

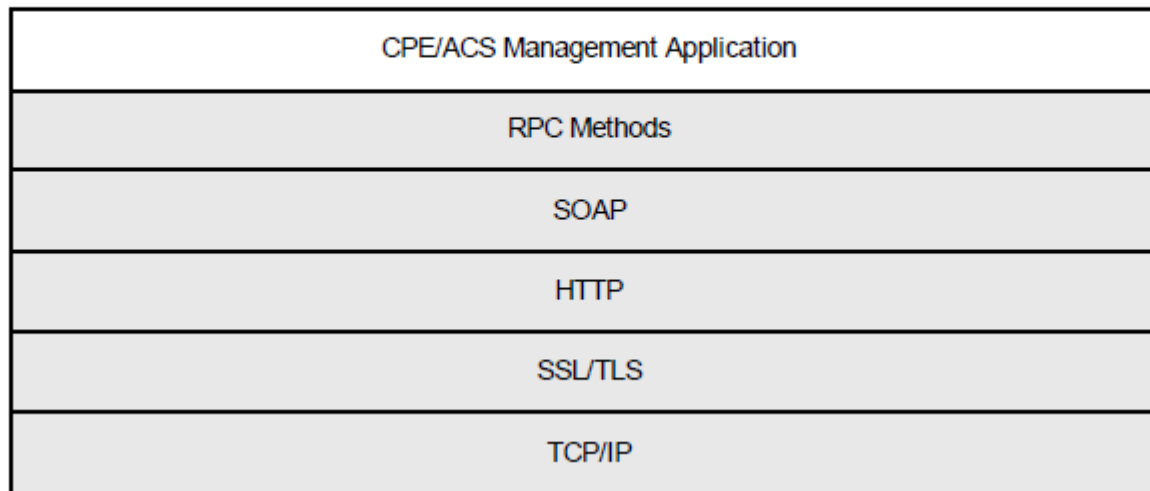
CWMP Functionality – cont'd

- 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

Celstream's Print Service Attribute Table



Celstream's Print Service Attribute Table					
	Information	SNMP	EWS	Access	Comments
Network configuration	DNS and WINS Configuration	No	Yes	Read-write	
	SMTP configuration	No	Yes	Read-write	
	FTP configuration	No	Yes	Read-write	
	HTTP configuration	No	Yes	Read-write	
	LPD and Port 9100	No	Yes	Read-write	
	SNMP configuration	No	Yes	Read-write	
	Time	No	Yes	Read-write	
	TCP/IP	Yes	No	Read-write	
Printing Settings	Email alerts configuration	No	Yes	Read-write	
	Finishing configuration	No	Yes	Read-write	This includes configuration of banner & separator sheets, Resource save, collation, blank pages etc
	Scan, print, fax settings	No	Yes	Read-write	Darkness, Resolution Error and toner alarm switches, fax phone number etc
	PCL settings	No	Yes	Read-write	Font, Duplex, paper size, orientation, draft mode, color mode etc
	PS settings	No	Yes	Read-write	Error report flag, Timeout, paper select
Printer information	Printer general, identification and asset information	Mostly Yes	Mostly No	Few are read-write	Asset info, identification info, printing speed, memory size, language
Consumables and paper usage	Consumable status and estimates	Yes	No	Read	
	Service	Yes	No	Read	Drum, fuser, roller information
	Paper – Metering	Yes	No	Read	
	Tray status	Yes	No	Read	Printer interaction
SNMP and EWS connection settings		No	Yes	Read-write	