WBMM Basic Definitions of Components, Connections and Messages
WW –13Aug2003

Terms:

Managee: The imaging device or service that is monitored or managed, directly or indirectly via WBMM. (Managee)
Management Agent: The entity, either embedded in a Managee or in a WBMM proxy, that contacts the WBMM Management Application to receive management instructions and monitoring requests, and that communicates with the Managees to effect these instructions and acquire the requested information. (Agent)
Management Application: The WBMM entity receiving management information and providing management instructions directly or indirectly from the Managees. (Application)
Management Server: the equipment and programs, including the network services implementation, supporting the Management Application. (Server).
Message: The structured communication between the Agent and the Application. A message may be a report, alert, schedule, request for or response to an operation, or other type as described below.
Operation: The action that is being requested of the Agent by the Application with respect to the Managee. Operations may include requests for to changes to element values, state changes, etc.
Schedule: A set of operations and/or message requests from the Application to the Agent along with instructions relative to implementing these at a future time, periodically or under specified conditions.
Security Policy: Conditions set up at t he Management Agent and the Management Application governing:

Servers with which the Management Agent will communicate
Level of Authentication that the Management Agent requires and is prepared to supply
Use and Level of message encryption

Aspects:

WBMM is not a network protocol nor a network service nor a management "system" Rather it is a definition of how standard, extant network services and protocols can be used to address the use cases identified for remote imaging equipment management. There are three aspects or layers of WBMM, which are intended to work together to satisfy the requirements.

Communication: approach to using Web Services or Email including the types of messages characterizing WBMM
Operations: the set of "intents and responses" communicated, along with the necessary parameters
Representation of Management Information: the "management information model" and coding

Although intended to work together, these three aspects could be used separately. The communications approach could send an entirely different set of message formats and operations. Many of the operations are indeed extracted from other protocols. And the management model and coding may be used in other environments or r alternatively may be replaced with a different model in a remote (non-WBMM compliant) management implementation.

It is therefore suggested that, although there should be some tracking to ensure compatibility and effective handing of the use cases, these three areas can be investigated and defined separately. Just as the communications consideration merely describes the use of standard services, and the Operations may be based on a previous set of IPP printer operations, the Management model and coding could use or build upon other defined or existing systems if they are considered suitable.

Communications:

To address the basic internet orientation of WBMM, two network services are considered: Web Services using HTTP and Email using SMTP (and message recovery such as POP3 or IMAP4). The WBMM messages and operations should be valid communicated via either service.

There are some guidelines established for security purposes.

- An application cannot directly initiate communication with an agent.
- An agent may only communicate with one (or a small, restricted set) of designated servers
- There will be extensive use of authentication and possibly encryption
- The agent must appear and act as a standard client using the applicable services in the same environment.

With Web Services the agent must always initiate the connection. A slight exception to this is the ability of the agent to sense a “tickle”, prompting it to communicate with the designated server. The analogous situation with Email is that the agent will send a message to the application and will then poll the EMAIL server for a response. The agent must discard any unsolicited messages. The slight exception is that instructions to the agent may include that the agent poll periodically for the equivalent to a tickle. That is, the agent may check for a message that prompts the agent to send a query to its designated management application.

Regardless of the transport, the basic message types characterizing the WBMM functions are:

> **Report**: An *Agent* contacts designated *Application* at previously defined date-time with values of previously defined objects. Application can return a request that the Agent send a Command Query.

Alert: *Agent* contacts designated *Application* on occurrence of previously defined event. The event may be some combination of state/status conditions, subject to moderation criteria, all previously defined. In a real-time connection, the Server can respond with immediate operations, or can request that the agent send a Command Query. However, the Application cannot change any *Schedule* previously communicated to the Agent.

Command Query: *Agent* **contacts** *Application* for instructions, requests for operations and Schedules. This query may be sent

1. At previously defined times or periods
2. In response to a tickle.
3. In response to a local command
4. In response to a request returned to a report.

On real-time connections, a Command Query opens a path whereby the Application *can* request operations immediate requests or can send a Schedule of operations to the *agent.* For non-real-time communication, the agent follows a Command *Query* with a polling of the EMAIL server to receive messages from the Application requesting operations or containing a Schedule.

Tickle: On an intranet implementation, *Application* sends a unicast, unidirectional message requesting that the *Agent* to which the Tickle is directed send an immediate Command Query to the identified Application. The protocol has not been determined but could use UDP. The message should be minimal with just the identification of the Server to be contacted, or a request that the Agent check its mailbox, and the date-time of the message for tracking. Depending upon the policies set up at the Agent, it may or may not respond to this tickle.

All messages must include the following information in addition to the basic payload (report, alert, or operation). This must consider that WBMM must operate with proxies handling multiple devices.

- Identify the agent and the application. The Agent identification may include location.
- Identify the specific device or the group of devices involved.
- Identify time of transmission

It is suggested that these elements be in the message, even though this may appear to be redundant with information included as part of the transport protocol.

Operations:

Operations may be requested in responses to Alert or Command query messages, or they may be embedded in Schedules. The message will properly indicate the Managee to which the operation is to be directed, and in the case of a Schedule, the time at or condition under which the operation is to be performed.

The following summary remains conceptual. There may be advantage in grouping certain similar operations under one operation name with distinguishing parameters. (For example, “Disable” and “Deactivate”).

Disable – Prevents the Managee from accepting jobs from any job submission protocol.
Enable - Allows the Managee to accept jobs from any job submission protocol.
Pause- Causes the Managee to stop processing its primary product (e.g., a printing device from marking media, a scanning device from scanning input copy). There may be a need for an argument to address the “now”, “after current copy” and “after current job” variations.
Resume – Undoes the last Pause.
Deactivate – Combination of Disable and Pause. May be made a variation of Disable.
Activate – Undoes the last Deactivate
Purge - Removes all traces of jobs in the Managee
Reset - Sets the state of the Managee to the normalized condition characterizing the state when the Managee first comes up.
PowerOff – Causes Managee to go into a power off or (or reduced power, sleep) condition.
GetAttributes – Solicits the values of the identified elements and all included sub elements
SetAttributes – Sets the values of the identified elements and all included sub elements
GetResource - Solicits the values of the identified structures or files. (e.g., representing fonts, forms, executable code). May be indirect in that structure is delivered to defined address.
SetResource – Causes identified structures or files (e.g., representing fonts, forms, executable code to be loaded into Managee. May be indirect in that structure is obtained from defined address.
Register - Set up for notification (may borrow from some other notification effort.)
Unregister- Discard setup for notification.

Representation of Management Information:

Current thinking on this effort is pretty much represented by Ira’s representative schemas evolved from the printer MIB.