OPEN Compute Summit

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“IPMI over HTTPS”

Overview of Intel’s presentation/proposal to the IPMI Promoters Group

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Disclaimers

This presentation contains material that has been proposed by Intel to the IPMI Promoters Group.

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Looking for general feedback / interest level on the concept

Background

- The present IPMI Specification uses a transport protocol called “RMCP+” (Remote Management Control Protocol +)
    - Introduced with IPMI v2.0 in February, 2004.
    - Designed to fit on 8-bit microcontrollers with limited resources and network connectivity.
        - UDP based. Low processing overhead for IPMI messages.
    - Uses standard algorithms for integrity and confidentiality
        - Supports HMAC-SHA256 and AES-128
    - Session establishment uses a key exchange protocol called “RAKP” (Remote Access Key exchange Protocol)
        - Form of symmetric challenge/response with pre-shared keys.
    - 20 byte (160 bit) ‘per user’ key + additional 20 byte (160 bit) “Kg” ‘per bmc’ key.

Why IPMI over HTTPS ?

- Increased user desire well-known “Internet Standard” protocols

- Easier to develop remote applications
  - More development tools available for HTTPs/TLS
  - Greater developer familiarity with HTTP formats

- Takes advantage of TLS/HTTPS infrastructure
  - For session integrity and confidentiality

- BMC Performance is less of an issue
  - 8- and 16-bit BMCs have migrated to 32-bit
  - Execution speed has increased
  - Many BMCs still have RAM limitations

Supports standard transport while preserving IPMI’s
‘byte efficiency’ and ecosystem

Proposal Highlights

- Uses TLS with certificates for the remote-console to BMC connection
  - TLS is used to provide the encryption (confidentiality) and integrity for the connection.
    - Including protection from low-level man-in-middle and replay attacks.

- Uses HTTP and JSON as the transport protocol for IPMI operations
  - DISCOVER OPERATION SUPPORT
  - GET SESSION CHALLENGE
  - IPMI USER LOGIN
  - IPMI USER LOGOUT (also terminates HTTPS session)
  - TRANSFER IPMI MESSAGE
  - TRANSFER SOL DATA
  - TRANSFER OEM/ORG DATA

- IPMI LAN Alerting is unchanged
  - Continues to use SNMP-based “Platform Event Trap” format

Next Level

- HTTP PUTs only
  - Good fit with IPMI messaging request/response approach
  - Simplifies implementation and parsing
- Uses IPMB-based Message Format
  - Leverages existing tools (just replaces RMCP+ transport layer)
  - Simplifies mixed support of HTTPS and RMCP+ BMCs at same site
- Includes IPMI-specified User Login exchange
  - Provides a basic BMC attestation mechanism
  - Assumes TLS Certificates themselves may not be authorized or trusted and consequently that BMCs may be spoofed.
- Does not introduce a ‘human readable’ interface for IPMI
- OEM Payload support is not part of proposal
  - Can use OEM/ORG –specific transfers instead

Example: IPMI Message Transfer

```
PUT /IPMI/msg/session_ID HTTP/1.1
Host: example.org
User-Agent: IPMI/1.0
Content-length: nnn
Content-type: application/json
{
   "DATA": "msg_data",
   "GET": "y_n"
}

HTTP/1.1 200 Ok
Date: Wed, 20 Dec 2013 17:02:12 GMT
Content-Length: nnn
Content-type: application/json
{
   "STATUS": "status",
   "DATA_R": "r_msg_data",
   "GET_R": "r_y_n"
}
```

The requested IPMI operation is identified in the URI of the PUT

msg_data = IPMI message data in hex-ascii encoding. The transfer is indifferent to whether the msg_data holds a request or a response message.

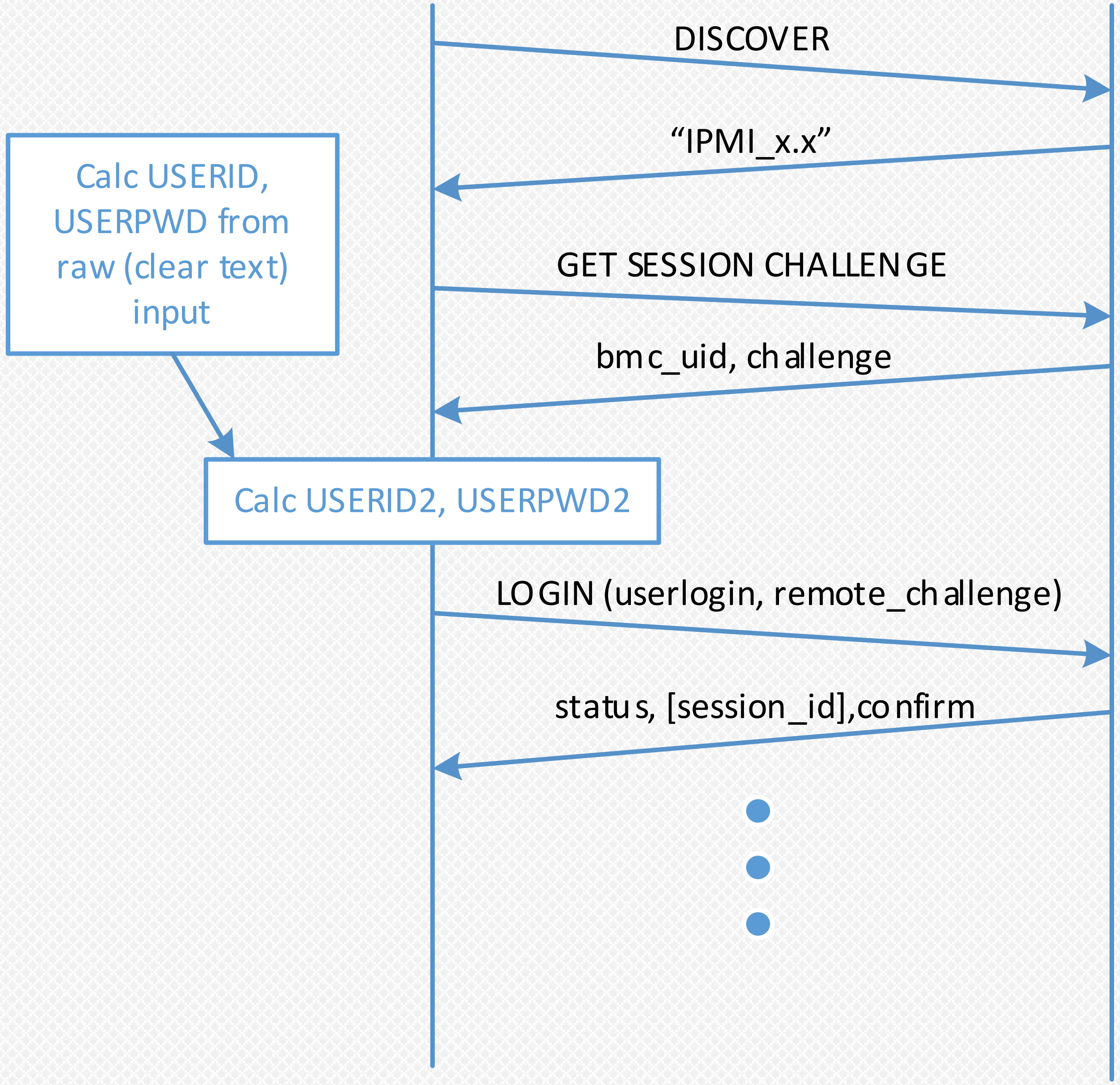
The “GET” parameter indicates whether the remote console wishes to get any outgoing message from the BMC. The remote console can choose to only transmit msg_data, only request r_msg_data, or do both.

The status code indicates status for the IPMI-over-https transfer only. It does not replace the IPMI Completion Code.

E.g. “OK” means the BMC accepted the requested operation from the PUT, but does not indicate whether the msg_data content itself is correct.

Simple definition IPMI Message transfer over an alternative transport

Example: Login flow


DISCOVER
“IPMI_x.x”
Calc USERID, USERPWD from raw (clear text) input
GET SESSION CHALLENGE
bmc_uid, challenge
Calc USERID2, USERPWD2
LOGIN (userlogin, remote_challenge)
status, [session_id],confirm

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