Change History for IBM Switched and Monitored PDU

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Current Official Potencia PDU Firmware Released Version OPDP_sIBM_v01.3_3 Release Date: 11/20/2014

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0.0 Introduction

This document is to log the change history of the Potencia PDU firmware. We categorized the firmware change into two parts:

- 1) Firmware function enhancement,
- 2) Problems fixed

For Potencia PDU firmware, each release is coded by date. For example, the Potencia PDU initial firmware (MP) is OPDP_sIBM_v00.1_0302, which means it was release on 03-02-2010.

1.0 Enhancements

This section describes the new required/added PDU functions to enhance PDU functionality.

1.1 Initial release OPDP_sIBM_v00.1_0302

The firmware version **OPDP_sIBM_v00.1_0302** is the official release and approved by IBM to be MP version.

2.0 Problems Fixed

This section describes the release history to fix any defect issues of Potencia PDU.

2.1 Initial release OPDP_sIBM_v00.1_0302

The official release and approved Potencia PDU firmware is **OPDP_sIBM_v00.1_0302**.

2.2 Firmware release OPDP_sIBM_v00.1_0607

2.2.1 Release Summary

Within this release, we fixed:

- 1) Defect item #503974 TFTP firmware upgrade fails with Linux environment (atftpd and tftpd).
- 2) Defect item #503975 DHCP fails if with zeros in IP octet

2.2.2 Detailed descriptions and solutions

1) Defect item #503974 - TFTP firmware upgrade fails with Linux environment

Symptom:

When attempting to update the firmware on the Potencia PDU from the web interface using TFTP, if the IP address of the TFTP server entered ends with 255 in the last octet, the TFTP upload fails.

Note that this is a scenario where 255 is valid in the last octet (the subnet mask was 255.255.192.0 and the server IP was 192.168.0.255).

Root Cause Analysis:

According to RFC 2349, ittimeout value should be within the range of $(1 \sim 255)$. As IBM captured data, the timer timeout value is 60000, which is out of range. The out of range timeout value could potentially cause the TFTP download failure.

Solution:

By setting the timer timeout value to be the correct value (to be 100) as described in RFC2349, we verified it, in the same procedure of IBM, to be able to fix this problem.

2) Defect item #503975 – DHCP fails if with zeros in IP octet

Symptom:

When the Potencia PDU attempts to DHCP, it will fail, if one of at least three conditions occur:

1. The static address was set, with an IP address with a zero in one of the octets, and then the Potencia is set to DHCP. In this case DHCP discover shows up in a network trace as truncated.

2. The static address was set, with an IP address without a zero in one of the octets, and then the Potencia is set to DHCP and the DHCP server hands out an address with a zero in one of the octets. In that case, the DHCP discover from the Potencia is OK, but the DHCP request from the Potencia is truncated.

3. Both the static and offered IP addresses do not have zeros in any of the octets, but the server-identifier in the offer has a zero in one of the octets. In this case, the DHCP request from the Potencia PDU will be truncated.

It appears that the reason for all of these errors probably has the same root cause-whatever code is putting the IP addresses into the DHCP packets in the Potencia PDU is interpreting the zero in one of the IP address octets as a string terminator and truncating the packet at that point.

Debug Action: If there are no zeros in any of the IP address octets, the DHCP from the Potencia PDU does work.

Root Cause Analysis:

As calculated the length of the DHCP option, we used the "strlen" of the standard C library. However, 0x00, which as described in the IP address, is treated as terminated character and cause "strlen" function to return incorrect DHCP option length. This incorrect length causes the incorrect interpretation of the DHCP protocol, and then terminates the DHCP handshaking between DHCP client (Potencia PDU) and DHCP server.

Solution:

Instead of using standard C library (strlen), we calculate the real length, for example, 192.168.0.1, we calculate the length to be 4 (bytes). With this solution, we verified it to be able to fix this problem.

2.3 Firmware release OPDP_sIBM_v00.1_0624

2.3.1 Release Summary

Within this release, we fixed:

- 1) Defect item #22770 The firmware name is too long and will be truncated as doing firmware upgrade.
- 2) Defect item #22771 PDU fails download if address ends in .255
- 3) Defect item #22808 PDU TFTP firmware update fails
- 4) Defect item #22809 PDU telnet cannot use "." character

2.3.2 Detailed descriptions and solutions

1) Defect item #22770 – The firmware name is too long and will be truncated as doing firmware upgrade.

Symptom:

The switched and monitored Power Distribution Unit (PDU) firmware update Process through the web browser may fail as the text field truncates the text, removing the last characters from the file name.

Root Cause Analysis:

The filename is set to be 32 characters. If it is more than 32 characters, it will be truncated, as described.

Solution:

We enlarge the size of the filename to be 64 characters to fix this problem. (Please be noted that the MIB file of AEM define this field to be max. 32 characters.)

2) Defect item #22771 - PDU fails download if address ends in .255

Symptom:

In cases where a server address ends with a 255 octet, the Switched and monitored Power Distribution Unit (PDU) firmware update process will fail stating that it is unable to download the file.

When attempting to update firmware through the web browser, a Trivial File Transport Protocol (TFTP) server address is requested. The server is reachable from the PDU, however, the download displays an error.

Root Cause Analysis:

We verify the field to be valid from $0 \sim 254$, and will cause reported problem, as the field is 255.

Solution:

We correct the field value from $0 \sim 255$ to fix the problem.

3) Defect item #22808 – PDU TFTP firmware update fails

Symptom:

When updating the Switched and Monitored Power Distribution Unit (PDU) firmware through the web interface with the target file residing on a Linux server, an error may occur stating the following:

TFTP Connection Message Connect Failed! Please Check TFTP IP Address, File Name or Firewall Setting!

Root Cause Analysis:

The TFTP option - tsize and ttimeout cause this problem.

Solution:

Remove the limitation of tsize and ttimeout to fix this problem.

4) Defect item #22809 - PDU telnet cannot use "." character

Symptom:

If attempting to change the Internet Protocol (IP) address of the Switched And Monitored Power Distribution Unit (PDU) via Telnet, the user will not be able to input the dot (.) character.

Root Cause Analysis:

This is a bug of ignoring the input of ".".

Solution:

We modify the code to take care of the input of "." character to fix it.

2.4 Firmware release OPDP_sIBM_v01.0_0.bin

2.4.1 Release Summary

Release date: 12/7/2010

Please be noted that we updated the release version to OPDP_sIBM_v01.0_0, instead of v00.1_0.xxxx (xxxx is the release day).

Here v01.0_0, this release code is Delta internal release for QE test

- v01.0_0, this release code is the release for customer to indicate a "minor" change
- v01.0_0 this release code is the release for customer to indicate a "major" change

Within this release, we fixed:

- 1) The DHCP issue, which the assigned IP will be 0.0.0.0, if the original IP have one "0", e.g. 192.168.0.2.
- 2) We create a new function for end-user to reset ADMIN/USER login IDs and Password.

2.4.2 Detailed descriptions and solutions

1) The DHCP issue to handle assigned IP address

Symptom:

If there is any "0" for IP, at the time to "ENABLE" DHCP function, the assigned IP address from DHCP server will be 0.0.0.0

Root Cause Analysis:

This is a bug. As DHCP assigned a reasonable IP address, the DHCP client (PDU) have a bug to handle this assigned IP address after comparing with the original IP and cause the problem to assign 0.0.0.0 as the IP for PDU.

Solution:

We fixed this bug and had verified it.

2) The reset ADMIN/USER login ID and password function via reset button

Symptom:

As end-user forgot or meshed up the login ID and password, there is no way for end-user to reset the meshed up login ID and/or password. Therefore end-user can not to operate/control this PDU.

Root Cause Analysis:

New feature added.

Solution:

We added a new feature to allow end-user to reset password via reset button. Remotely reset login-ID and password is not provided, regarding to security issue. Only the maintainer aside the PDU can reset the login-ID and password locally.

Here we re-defined the function of the reset button:

- a) If end-user "hold" the reset button for 2 seconds and then release the reset button, the login-ID and password will be restored to default, which is ADMIN/1001 for ADMIN level, and USER/1000 for user level, no matter what it is before.
- b) If end-user "hold" the reset button for 8 seconds, no matter whether he/she release the reset button, the system will be restarted (software restart)
- c) Please be noted that both (a) and (b) reset function (reset login-ID/password and system restart) will not affect any output during proceeding these functions.

2.5 Firmware release OPDP_sIBM_v01.1_1.bin

2.5.1 Release Summary

Release date: 2/18/2011

Please be noted that we change the release coding to OPDP_sIBM_vxx.yy_zz.bin. Please refer to section 2.4.

Within this release, we fixed:

- 1) The ENP (Environmental Probe)
- 2) The algorithm to enhance the communication between WEB board and Meter board.
- 3) The firmware upgrade mechanism and interface to download the meter firmware via network, i.e. to upgrade the meter firmware remotely. (New added function)

2.5.2 Detailed descriptions and solutions

1) The ENP (Environmental Probe) issue **Symptom**:

Sometimes, the ENP is not detected.

Root Cause Analysis:

This is a bug. The ENP loses communication with WEB board.

Solution:

We fixed this problem by adding the heart-beat to assure the communication with WEB board.

2) The communication confliction between WEB board and meter board

Symptom:

As reported issue, the SNMP access is fail.

Root Cause Analysis:

This is caused due to RS-232 communication confliction between WEB board and meter board. Since this failure, the WEB board is not able to build up the outlet table. Therefore the SNMP access will be failure since the outlet table is "empty".

Solution:

Instead of asking micro-controller (x2) of meter board to initialize the communication with micro-controller of WEB board, we modify the control scheme, initializing by the micro-controller of WEB board to get rid of communication confliction.

3) The mechanism to update the meter firmware via WEB board through network

(remotely). <u>Symptom:</u> New added function.

Root Cause Analysis:

New added function.

Solution:

We create an interface on the embedded WEB server so end-user can upgrade meter firmware via this interface.

2.6 Firmware release OPDP_sIBM_v01.2_0.bin

2.6.1 Release Summary

Release date: 8/18/2011 Within this release, we resolved following reported issues:

- 1. History log stop logging data
- 2. The history log has wrong value

- 3. The history log displays incorrect label for outlet 9~12
- 4. The HTTP security concern when using curl tool to get XML data
- 5. The SNMPv3 contents of the msgAuthoritativeEngineBoots and the msgAuthoritativeEngineTime fields are incorrect
- 6. Change the ex-factory default Relay setting from "Relay-All-OFF" to Relay-All-ON", required by IBM (Specification change.)

2.6.2 Detailed descriptions and solutions

1) History log stop logging data & wrong value ((1) & (2)) <u>Symptom:</u>

The power usage, as light load, is not updated.

Root Cause Analysis:

This is a bug. As light load, the algorithm may just ignore the energy usages.

Solution:

We fixed this problem by adjust the algorithm to response light load case.

2) The history log displays incorrect head label for outlet 9~12

Symptom:

The head labels of the history are incorrect – the labels for outlet $5 \sim 8$ showing twice but no labels for outlet $9 \sim 12$.

Root Cause Analysis:

There is a bug as printing out the head label.

Solution:

Fixing this bug by correcting the label printout.

3) The HTTP security concern when using curl tool to get XML data.

Symptom:

The problem is that the logon ID and password are shown in the output file when the command below is run. It looks like the output file has far more information than is needed by the command.

Root Cause Analysis:

The reason of show up the user account and password in curl command is that the embedded web server didn't process the request XML file with login-check, so it will send out unknown data, including account and password information.

Solution:

We fix this issue by filtering out the security concerned parameters.

4) The SNMPv3 contents of the msgAuthoritativeEngineBoots and the msgAuthoritativeEngineTime fields are incorrect

Symptom:

The problem occurs either while using AEM or while using an external client (I am using Net-SNMP) to issue SNMPv3 requests. I currently have Potencia PDUs at firmware version OPDP_sIBM_v00.1_0223 and configured for SNMP authNoPriv. When I issue the SNMPv3 requests, I notice that the response always has the same value for msgAuthoritativeEngineBoots (1) and msgAuthoritativeEngineTime (0).

Root Cause Analysis:

There is a bug to access the values of the msgAuthoritativeEngineBoots and the msgAuthoritativeEngineTime (0).

Solution:

We fix this issue by accessing the values correctly.

5) Change the ex-factory default setting of the Relays from "Relay-All-OFF" to "Relay-All-On"

Symptom:

This is a specification change, required by IBM

Root Cause Analysis:

This is a specification change, required by IBM.

Solution:

Following IBM's requirement, we change the default setting from Relay-All-OFF to Relay-All-ON.

2.7 Firmware release OPDP_sIBM_v01.2_1.bin

2.7.1 Release Summary

Release date: 2/17/2012

Within this release, due to MIB file change required by IBM, we modified the PDU firmware to add following functions accordingly:

- 1. ibmPduPhaseLastPowerReading
- 2. ibmPduThermalLastReading
- 3. ibmPduHumidityLastReading
- 4. ibmPduOutletLastPowerReading
- 5. ibmPduExtThermalLastReading
- 6. ibmPduExtHumidityLastReading

2.7.2 Detailed descriptions and solutions

1) ibmPduPhaseLastPowerReading <u>Symptom:</u> New add function to read phase last power.

Root Cause Analysis: New add function.

Solution: New add function.

2) ibmPduThermalLastReading<u>Symptom</u>: New add function to read last temperature.

Root Cause Analysis: New add function.

Solution: New add function.

3) ibmPduHumidityLastReading<u>Symptom</u>: New add function to read last humidity.

Root Cause Analysis: New add function.

Solution: New add function.

4) ibmPduOutletLastPowerReading <u>Symptom:</u> New add function to read outlet last power.

Root Cause Analysis: New add function.

Solution: New add function.

5) ibmPduExtThermalLastReading <u>Symptom:</u> New add function to read external last temperature.

Root Cause Analysis:

New add function.

Solution: New add function.

6) ibmPduExtHumidityLastReading<u>Symptom</u>: New add function to read external last humidity.

Root Cause Analysis:

New add function.

Solution:

New add function.

2.8 Firmware release OPDP_sIBM_v01.3_0.bin

2.8.1 Release Summary

Release date: (temporary release for Netezza, since the new part number approach is not decided yet.)

Due to the new function requirement (PowerOn Sequencing) from IBM/Netezza, we have to modify:

1. MIB file (update to ibmdpi_v1.3_0.mib)

- 2. The meter board firmware (update from 1.20 to 1.30)
- 3. The communication board firmware (update from 1.2_1 to 1.3_0)

2.8.2 Detailed descriptions and solutions

1) MIB file (ibmdpi_v1.3_0.mib)

Due to a new requirement, we modify the MIB file to add:

- ibmPduOutletGlobalDelayTimer OBJECT-TYPE

SYNTAXInteger32MAX-ACCESSread-writeSTATUScurrentDESCRIPTION"Global delay timer for all outlets. Range: 0 sec ~3600 sec.Default value:0 sec. To combine with Individual Delay timerto control outlet state/behavior as rack power on/restore"::= { ibmPduOutlets 3 }

- ibmPduOutletIndividualDelayTimer OBJECT-TYPE

SYNTAXUnsigned32MAX-ACCESSread-writeSTATUScurrentDESCRIPTION"The delay timer for each outlet as AC powerrestored.Range: 0 sec ~ 3600 sec.Default Value: 0 sec.To combine

with Global Delay timer to control outlet state/behavior as rack power or or restore"

::= { ibmPduOutletEntry 14 }

- ibmPduReboot OBJECT-TYPE

SYNTAX Unsigned32 MAX-ACCESS read-write STATUS current DESCRIPTION "Set 1 to reboot PDU." ::= { ibmPduMetadata 12 }

2) Meter board firmware (1.30)

Original meter board firmware design (release 1.20) is to have the initial state of the relay to be "ON" so as power ON, the PDU can provide power immediately. However, as the PowerON sequencing requirement, the relay initial state can not be ON otherwise the outlet behavior will be ON \rightarrow OFF, and then control by the delay timer. To resolve this issue to satisfy the new requirement - PowerON sequencing function, we have to modify the relay initial state from ON to OFF and to update the meter board firmware accordingly.

Please be noted that Delta will not release the meter bard firmware for end users. Any end users would like to have the new required PowerON sequencing function, please go through RMA to have the meter board firmware supported.

3) Communication board firmware

Due to the new requirement, we modify the communication board firmware to support interfaces for end users to configure the GlobalDelayTimer and IndividualDelayTimer. The interfaces include:

- Serial port (Hyper-terminal or similar serial control applications)
- Ethernet Port (Telnet and SNMP)

Please be noted that for this requirement, IBM/Netezza DO NOT require WebGUI interface. Therefore the WebGUI is not supported to configure GlobalDelayTimer and IndividualDelayTimer.

2.9 Firmware release OPDP_sIBM_v01.3_1.bin

2.9.1 Release Summary

Release date: 3/8/2013

Since IBM finally decide to use new part number (P/N), within the communication board firmware, we have to modify the communication board

IBM Potencia PDU										
Delta Part#	Option	IBM PN	NEW IBM PN	IBM FRU	NEW IBM FRU	Program Name	NEW PDU KIT	NEW EC#	Remarks	
AD- 380/32AA	46M4002	43V6143	46W1607	46M4014	46W1611	1U (Rack)	00AK102	N32463E	9 C19 & 3 C13 (unattached line cord) - 3 phase WYE: 16/32 Amp; Single phase: 24/32/48/63 Amp)	
AD- 208/48AA	46M4003	43V6144	46W1608	46M4015	46W1612	1U (Rack)	00AK103	N32463E	9 C19 & 3 C13 (attached line cord) - 3 phase Delta: 48 Amp	
AD- 380/32BA	46M4004	43V6145	46W1609	46M4016	46W1613	1U (Rack)	00AK104	N32463E	12 C13 (unattached line cord) - 3 phase WYE: 16/32 Amp; Single phase: 24/32/48/63 Amp	
AD- 208/48BA	46M4005	43V6146	46W1610	46M4017	46W1614	1U (Rack)	00AK105	N32463E	12 C13 (attached line cord) - 3 phase Delta: 48 Amp	

firmware accordingly to have PDU firmware support both "new" P/N and "old" P/N.

2.9.2 Detailed descriptions and solutions

1) Communication board firmware (OPDP_sIBM_v01.3_1)

The firmware modification is to have PDU can automatically recognize both the new P/N and old P/N. So any PDU which is upgraded to 1.3_1, even its EEPROM still using old P/N, it still can be upgraded to have the new PowerON sequencing function.

2.10 Firmware release OPDP_sIBM_v01.3_2.bin

2.10.1 Release Summary

Release date: 04/11/2014

Since IBM finally decide to use new part number (P/N), within the communication board firmware, we have to modify the communication board firmware accordingly to have PDU firmware support both "new" P/N and "old" P/N.

- 43V6143→46W1607 (v01.3_1) → 00AK184 (v01.3_2) (KC)
- $43V6145 \rightarrow 46W1609 (v01.3_1) \rightarrow 00AK187 (v01.3_2) (KC)$

						IB	M POTE	ICIA PDU	-					
Program Name	Delta Part#	IBM Option PN	New Option P/N (KC)	OLD IBM PN	Current IBM PN	New P/N (KC)	old IBM Fru	Current IBM FRU	New FRU P/N (KC)	Current PDU KIT	NEW EC#	Remarks	KCEMC	KC Safety Cert
0U (Strip)	AD-380/164A	43V6108	NA.	43V6106	NA	NA	43V6112	NA.	NA.	NA	NA			
OU (Strip)	AD-208/304A	43V6109	NA.	43V6107	NA	NA.	43/6113	NA.	NA.	NA.	NA		_	
1U (Rack)	AD-380/324A	46M4002	004K185	43/6143	46W1607	00AK184	46/14014	46W1611	00AK185	00AK102	N33016Q	9 C19 & 3 C13 (unattached line cord) - 3 phase WYE: 16/32 Amp; Single phase: 24/32/48/63 Amp)	Completed	Completed
1U (Rack)	AD-208/48AA	46M4003	NJA.	43/6144	46W1608	NA	46144015	46W1612	NA	00AK103	N32463E	9 C19 & 3 C13 (attached line cord) - 3 phase Delta: 48 Amp	No	No
1U (Rack)	AD-380/328A	46M4004	00A/K189	43/6145	46W1609	00AK187	45/14015	46W1613	00AK188	00AK104	N33016Q	12 C13 (unattached line.cord) - 3 phase WYE: 16/32 Amp; Single phase: 24/32/48/63 Amp	Completed	Completed
1U (Rack)	AD-208/498A	46M4005	MA-	43/6146	46W1610	NA	4514017	46W1614	NA	00AK105	N32463E	12 C13 (attached line cord) - 3 phase Delta: 48 Amp	No	No
			17 - 13		3	IBM	PENDER	HVDC PD	U					
IBM 1U Higher Voltage DC PDU (240V/380V)	DD-18240-A	44T0966			4470968			4470969				6 DC outlet, Pender HV DC PDU (AP/EMEA)		
1U (Rack) HVDC	DD-18240-A	4470977			44T0979			44T0980				5 DC autost, Remilico HV DC POU (US/JAPAN)		

2.10.2 Detailed descriptions and solutions

1) Communication board firmware (OPDP_sIBM_v01.3_2)

The firmware modification is to have PDU can automatically recognize both the new P/N and old P/N. So any PDU which is upgraded to 1.3_2, even its EEPROM still using old P/N, it still can be upgraded to have the new PowerON sequencing function.

2.11 Firmware release OPDP_sIBM_v01.3_3.bin

2.11.1 Release Summary

Release date: 11/20/2014

IBM required to access Voltage and Power Factor (PF) via SNMP interface. Per this requirement, we implement the required function according

a) Modify and update the MIB file from ibmdpi_v01.3_0.mib to ibmdpi_v01.3_1.mib accordingly.

 b) Implement SNMP function for user to access voltage and power factor through SNMP interface. The firmware version is update from OPDP_sIBM_v01.3_2.bin to OPDP_sIBM_v01.3_3.bin accordingly

2.11.2 Detailed descriptions and solutions

1) Potencia PDU firmware (OPDP_sIBM_v01.3_3)

This firmware (OPDP_sIBM_v01.3_3.bin) is to add two SNMP function so end-users are able to access "Voltage "and "Power Factor" through SNMP interface.