

Operating Manual

WAP3212-001-001 / RD-FA2066-01



Lufthansa Technik

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Title

Operation Manual: Cabin Wireless Access Point, Dual Radio

Equipment Designation

Type / model No.

WAP3212-001

Part Number(s)

WAP3212-001-001 (PAC P/N: RD-FA2066-01)

Reference

Specification CSE-23-14-0012 (PAC ASC-FA2066-01)

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IR	Initial Issue	11.03.2014
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02	(1.1) Added english/french regulatory statement (4.1) Added statements for regulatory limitations	13.03.2015
03	(4.3) Added statements for user information	31.03.2015
04	(1.1) Compliance Statement: Outdoor Antenna usage deleted.	10.04.2015



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1. Introduction

This document provides information for installation and integration of the Wireless Access Point P/N WAP3212-001-001:C1008 (RD-FA2066-01) referred to as the WAP in this manual.

The WAP is designed and manufactured in accordance with all requirements for installation in aircraft cabins.

1.1. Compliance Statement

English:

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This Class B digital apparatus complies with Canadian ICES-003.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body

The use of any antenna other than those certified with the product is expressly forbidden by FCC rules 47 CFR part 15.204 and IC RSS standards.

Français:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil n' doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.

Cet équipement doit être installé et utilisé à une distance minimale de 20cm entre le radiateur et votre corps.

L'utilisation d'une antenne autre que ceux qui sont certifiés avec le produit est expressément interdite par la réglementation FCC partie 47 CFR 15.204 et IC normes RSS.

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1.2. About the WAP

The WAP is a high-performance IEEE 802.11 based wireless access point with an ARINC 628 housing for WLAN installations on aircraft. The radio module is provided by Aruba Networks and allows IEEE 802.11ac communication in addition to IEEE 802.11a/b/g/n. The WAP has 6 integrated antennas covered by a protective radome allowing 3x3 MIMO for both the 2.4GHz and the 5GHz band (see figure 1).

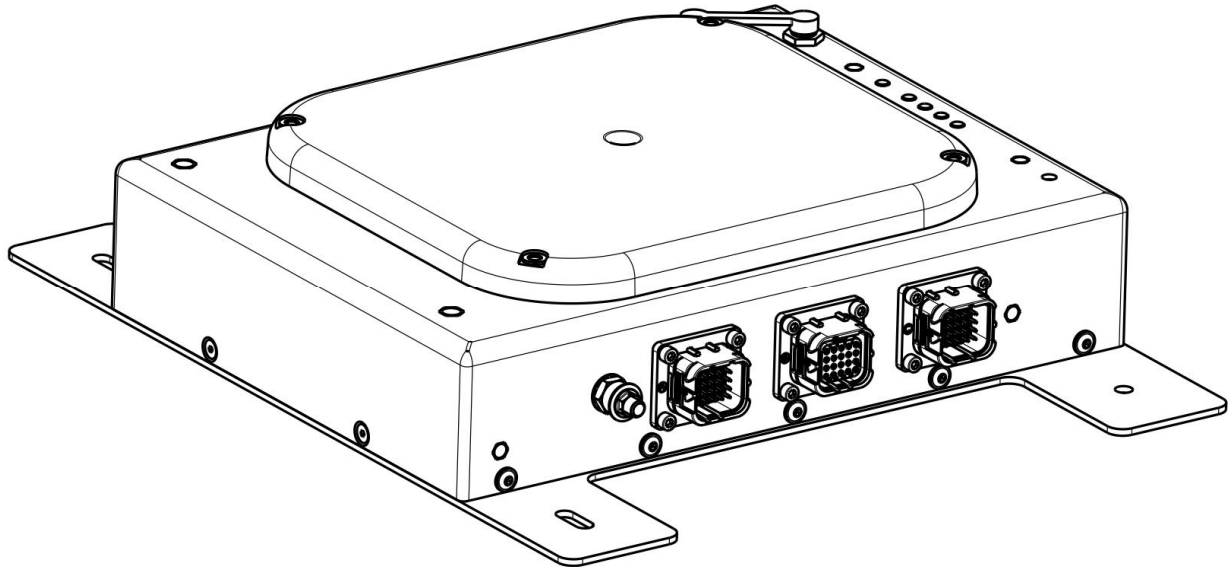


Figure 1-1: Isometric Drawing of the Wireless Access Point

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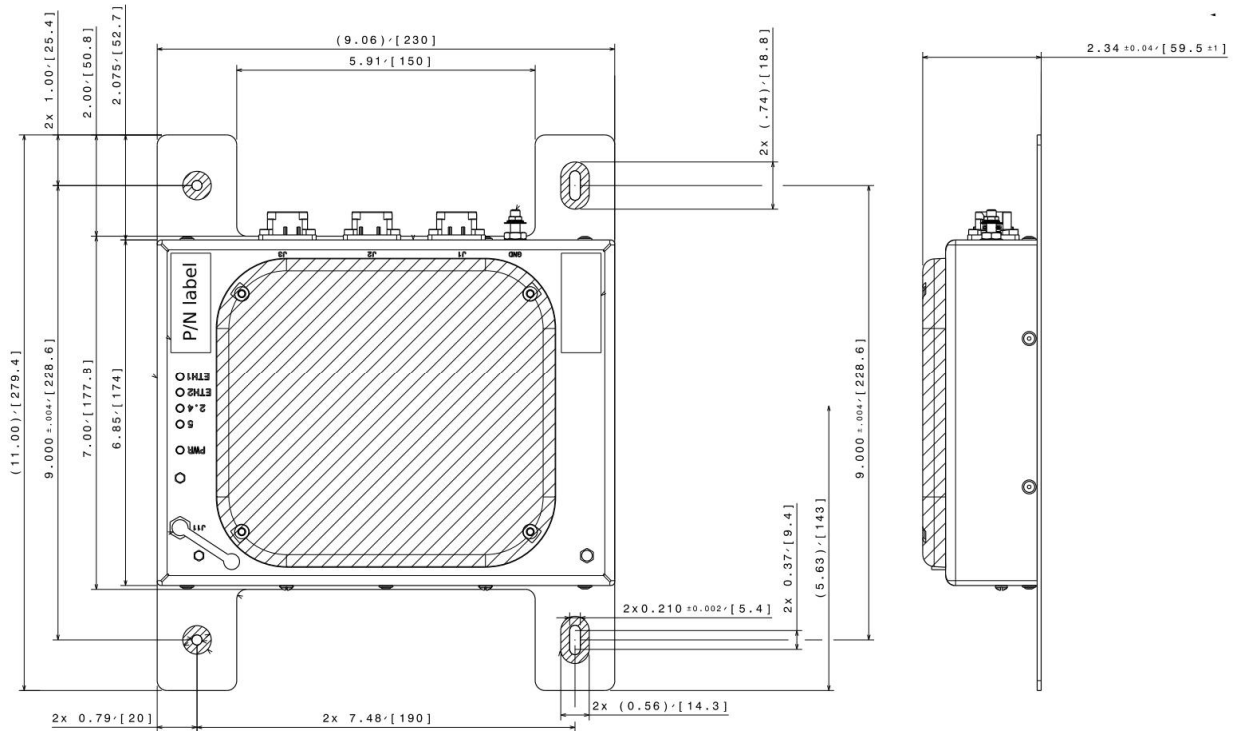


Figure 1-2: Outline Dimension Drawing of the Wireless Access Point

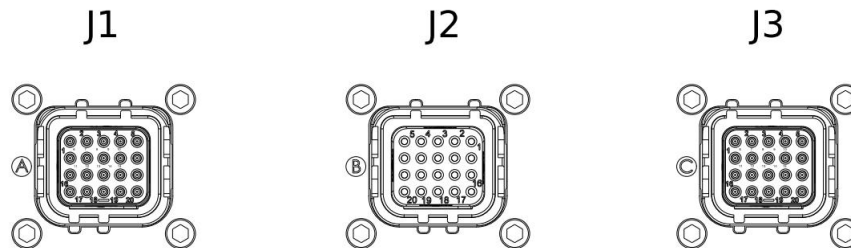


Figure 1-3: Connector Locations

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1.3. About this document

This document shall provide the information necessary to operate one or more WAPs in a lab environment as well as on an aircraft. This includes the mechanical, electrical and the software aspects.

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2. Setup

2.1. Connector Interface

J1		J2		J3	
PIN	CONNECTION	PIN	CONNECTION	PIN	CONNECTION
1	BI_DB+ (PORT1) *6	1	BI_DA+ (PORT2) *6	1	DISC_IN_CONF_STRAP_0
2	BI_DA+ (PORT1) *6	2	BI_DB+ (PORT2) *6	2	DISC_IN_CONF_STRAP_1
3	CHASSIS GND	3	CHASSIS GND	3	DISC_IN_CONF_STRAP_2
4	BI_DD+ (PORT1) *6	4	BI_DC+ (PORT2) *6	4	DISC_IN_CONF_STRAP_3
5	BI_DC+ (PORT1) *6	5	BI_DD+ (PORT2) *6	5	RESERVED
6	BI_DA- (PORT1) *6	6	BI_DB- (PORT2) *6	6	DISC_IN_CONF_STRAP_GND_0 *4
7	BI_DB- (PORT1) *6	7	BI_DA- (PORT2) *6	7	DISC_IN_CONF_STRAP_GND_1 *4
8	CHASSIS GND	8	CHASSIS GND	8	DISC_IN_CONF_STRAP_GND_2 *4
9	BI_DC- (PORT1) *6	9	BI_DD- (PORT2) *6	9	DISC_IN_CONF_STRAP_GND_3 *4
10	BI_DD- (PORT1) *6	10	BI_DC- (PORT2) *6	10	RESERVED
11	RESERVED	11	RESERVED	11	RESERVED
12	DISC_IN_POWER_ENABLE	12	DISC_IN_POWER_ENABLE *2	12	RESERVED
13	RESET *3	13	RESERVED	13	RESERVED
14	DISC_GND *5	14	DISC_GND *5	14	RESERVED
15	DISC_IN_RF_ENABLE	15	DISC_IN_RF_ENABLE *2	15	RESERVED
16	115V AC RETURN	16	115V AC RETURN	16	RESERVED
17	CHASSIS GND	17	CHASSIS GND	17	RESERVED
18	115V AC	18	115V AC	18	RESERVED
19	PIS1 *1	19	PIS1 *1	19	RESERVED
20	PIS2 *1	20	PIS2 *1	20	RESERVED

Figure 2-1: Pinning of WAP connectors

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2.2. Discrete Inputs

The WAP has following discrete inputs:

- Power enable "DISCRETE IN POWER ENABLE" Allow wireless or wired meshing of several CWAP for content mirroring and house keeping in terms of active radio management and roaming.

Config	IP STRAP 3	IP STRAP 2	IP STRAP 1	IP STRAP 0
A	ground	ground	ground	ground
B	ground	ground	ground	open
C	ground	ground	open	ground
D	ground	ground	open	open
E	ground	open	ground	ground
F	ground	open	ground	open
G	ground	open	open	ground
H	ground	open	open	open
I	open	ground	ground	ground
J	open	ground	ground	open
K	open	ground	open	ground
L	open	ground	open	open
M	open	open	ground	ground
N	open	open	ground	open
O	open	open	open	ground
DHCP	open	open	open	open

Table 1: Strapping Configurations

- RF enable "DISCRETE IN RF ENABLE"

To enable the WAP the DISCRETE IN POWER ENABLE needs to be connected to DISCRETE GND. To release the radio module from hardware lock the DISCRETE IN RF ENABLE needs to be connected to DISCRETE GND as well.

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2.3. ID Strapping

The WAP has four designated discrete inputs used as strapping pins to specify its position in the aircraft. The WAP applies the configuration parameters according to this strapping status.

It is recommended for testing to use configuration A (see table 1) for a single WAP or A, B, C, and so forth for multiple WAPs. Full DHCP configuration is limited until software version SWWAP-001-012.

```
<IPADDR_A>192.168.10.11</IPADDR_A>
<NETWORK_A>192.168.10.255</NETWORK_A>
<NETMASK_A>255.255.255.0</NETMASK_A>
<GATEWAY_A>192.168.10.1</GATEWAY_A>
<ARUBA_PHYSICAL_IPADDR_A>192.168.10.31</ARUBA_PHYSICAL_IPADDR_A>
<ARUBA_PHYSICAL_NETWORK_A>192.168.10.255</ARUBA_PHYSICAL_NETWORK_A>
<ARUBA_PHYSICAL_NETMASK_A>255.255.255.0</ARUBA_PHYSICAL_NETMASK_A>
<ARUBA_PHYSICAL_GATEWAY_A>192.168.10.1</ARUBA_PHYSICAL_GATEWAY_A>
<ACHANNEL_A>44</ACHANNEL_A>
<ATXPOWER_A>3</ATXPOWER_A>
<GCHANNEL_A>11</GCHANNEL_A>
<GTXPOWER_A>3</GTXPOWER_A>
```

2.4. Powering the WAP

The WAP will start the controller board as soon as the WAP is powered and the power discrete is connected to ground. During booting the WAPs status LED is blue after booting is finished the status LED turns green.

PWR ○

5 ○
2.4 ○
ETH2 ○
ETH1 ○

Figure 2-2: LED indications

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Caption	Indication	Meaning
PWR	dark	Controller board not powered
PWR	violet constant	Not booting, Maintenance mode
PWR	blue constant	Booting (will be switched on 10 seconds after power is applied)
PWR	green constant	Controller board ready, BITE ok
PWR	yellow blinking	BITE error
5	dark	5GHz radio module off
5	amber	constant 5GHz radio module on
2.4	dark	2.4GHz radio module off
2.4	amber	2.4GHz radio module on
ETH2	dark	Ethernet port 2 not connected
ETH2	amber constant	Ethernet port 2 link established
ETH2	amber blinking	Ethernet port 2 link established, transmission in progress
ETH1	dark	Ethernet port 1 not connected
ETH1	amber constant	Ethernet port 1 link established
ETH1	amber blinking	Ethernet port 1 link established, transmission in progress

Table 2: LED Indications of the WAP

Please note that it may take up to 10 seconds until the unit lights up the LED and starts booting after applying power and enable the DISCRETE IN POWER ENABLE.

The radio board is powered by the controller board as soon as the controller board itself is powered and the RF discrete is connected to ground.

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3. System Integration

3.1. Minimal Setup

The following section describes the operation of one or more WAPs along with a configuration and logging server. Note that a bootable USB sticks referred to as "SWWAP13-xxx-xxx: Service host for WAP3212-xxx-xxx" exists that provides all required servers.

The WAP expects a DHCP server in the network to provide a temporary IP address.

The WAP also explicitly queries DHCP options 56 and 67 (see table 3 for content) and will continue configuration and software load using the values provided by the server. If an IP address is provided but options are not provided by the DHCP the WAP continues booting and uses the software and configuration stored in the local memory. It replaces the temporary IP address by the one specified in the configuration. The TFTP server shall contain the full software release in the server root directory.

Option	Content	Meaning
67	index.txt	Name of index file referencing all software parts
56	IP address	TFTP server's address in the network

Table 3: Required DHCP options

3.2. Configuration

Within the TFTP root directory two files might be changed during testing:

`system_configuration.xml`

`aruba_configuration.cfg`

The "name" parameter in the `aruba_configuration.cfg` shall be used to identify the configuration. WAP software before version SWWAP-001-013 will not apply a changed configuration if the running configuration and the uploaded configuration have the same "name" parameter.

Aruba credentials in both configuration files must be in accordance.

After any change of these configuration files, the MD5 checksum files must be regenerated for the WAP.

3.3. Time Synchronization

The WAP does not have a buffered real-time clock included. It therefore depends on an external time source in order to write logs with correct timestamps and to keep the correct amount of log data in its internal memory. During each startup the WAP tries to connect to an external NTP time server and to synchronize the internal clock with it. The NTP time server address is specified in the system configuration file in the parameter `NTP_SERVER_IP`.

```
<NTP_SERVER_IP>192.168.10.1</NTP_SERVER_IP>
```

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3.4. Logging

The WAP can send log data to a server using the RFC 5424 syslog protocol. Logging can be configured using the following parameters:

```
<USE_REMOTE_SYSLOG_SERVER>1</USE_REMOTE_SYSLOG_SERVER>
<SYSLOG_SERVER_IP>192.168.10.1</SYSLOG_SERVER_IP>
<SYSLOG_SERVER_PORT>514</SYSLOG_SERVER_PORT>
<SYSLOG_LOG_LEVEL>5</SYSLOG_LOG_LEVEL>
```

3.5. Software Updates

Software updates (and downgrades) are provided during boot time by an external TFTP server. The WAP checks if the files provided by the TFTP are different from those installed. If so, they are applied automatically. Up to 5 minutes of boot time need to be given in case of an update.

3.6. Programming Interfaces

3.6.1. Controller Command Line Interface

- `restart`

restarts the WAP

- `versions`

shows all software part numbers currently installed

- `bite`

shows logs from the built-in test equipment process

- `leds`

shows all LED's current status

- `ssids`

Lists all configured SSIDs along with their status, 0 for disabled, 1 for enabled

Example output: "passengers,0,crew,1,maintenance,1"

- `ssid [enable|disable] SSIDNAME`

enables or disables

Example usage: "ssid enable Entertainment"

- `serialnumber`

shows the serial number of the LRU

- `partnumber`

shows the part number of the LRU

- `modifications`

shows all hardware modifications implemented (+ means implemented - not implemented, 0 not labelled)

Example output: "+++—"

- `radioserialnumber`

shows the radio board serial number or "N/A" if the radio is not booted

- `radiomodel`

shows the radio board model

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- `temperatures`

shows all temperatures in Celsius (high temperature zone; low temperature zone; power supply zone)

Example output: "67;65;55"

- `voltages`

shows the 12 V current and all voltages in Volt (12VC, 12V, 5V, 3.3, 1.8, 1.5, 1.1, Example:

"0.920;11.880;5.00;3.360;1.860;1.520;1.110")

- `timestamp`

shows the current Unix timestamp

- `radiouptime`

shows the radio uptime or "N/A" if the radio is not booted

- `discretes`

shows all current discrete's status in the following order (din poweron, din rfon, din reset, din configw1, dout power, dout rf, dout configw2 –

Example output: "on;on;off;off;off;on;off")

- `loadavg`

shows the controller CPU load average in standard Unix output

- `clientsconnected`

shows the number of clients connected to the access point or "N/A" if the radio is not booted

3.7. Controller SNMP Interface

The controller board provides an SNMP interface that allows receiving status information. Refer to the MIB file provided to you or as printed in this appendix A.

3.8. Radio SNMP Interface

The radio board provides an SNMP interface that allows receiving status information. The interface does not permit to make changes to the configuration. Refer to the MIB guides provided by Aruba.

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4. Regulatory Information

4.1. Allowed Usage of Channels

The usage of channels and power levels is generally restricted by law depending on the region of operation.

The WAP3212-00x-00x (RD-FA2066-01) has been designed in compliance with governmental requirements, so that only authorized network administrators can change the settings by specific configuration files after introduction and authorization by Lufthansa Technik TX-OE.

Access points are radio transmission devices and as such are subject to governmental regulation. Network administrators responsible for the configuration and operation of access points must comply with local broadcast regulations. Specifically, access points must use channel assignments appropriate to the location in which the access point will be used.

Channel assignments can be performed only by trained maintenance personnel via controlled configuration files, released by Lufthansa Technik TX-OE.

4.2. Conformity

The WAP conforms with RTCA DO-160G.

See the Certificate of Conformity (C-ABS566-EQ) and the Compliance Statement (C-ABS567-EQ) for specific information on operation in Europe regulatory domain.

4.3. User Information

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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Appendix A

SNMP Management Information Base

```
-- *****
--
-- Lufthansa Technik Wireless Access Point
-- Information Base for SNMP Network Management
--
--
--
-- The Lufthansa Technik Enterprise number is 28833.
-- The ASN.1 prefix to, and including the Lufthansa Technik Enterprise is:
-- 1.3.6.1.4.1.28833
--
-- *****
LHTWAP-MIB DEFINITIONS ::= BEGIN
IMPORTS
enterprises FROM RFC1155-SMI
sysDescr FROM RFC1213-MIB;
lufthansaTechnik OBJECT IDENTIFIER ::= { enterprises 28833 }
communication OBJECT IDENTIFIER ::= { lufthansaTechnik 1 }
hardware OBJECT IDENTIFIER ::= { communication 1 }
wap OBJECT IDENTIFIER ::= { hardware 2 }
identification OBJECT IDENTIFIER ::= { wap 1 }
status OBJECT IDENTIFIER ::= { wap 2 }
notification OBJECT IDENTIFIER ::= { wap 3 }
-- *****
-- MAR Array MIB Revision
-- =====
--
-- The Lufthansa Technik enterprise (1.3.6.1.4.1.28833)
-- communication Group (1.3.6.1.4.1.28833.1)
-- hardware Group (1.3.6.1.4.1.28833.1.1)
-- wap Group (1.3.6.1.4.1.28833.1.1.2)
-- identification Group (1.3.6.1.4.1.28833.1.1.2.1)
-- status Group (1.3.6.1.4.1.28833.1.1.2.2)
--
-- *****
partNumber OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Part Number of the WAP Unit."
::= { identification 1 }
serialNumber OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Serial Number of the WAP Unit."
::= { identification 2 }
bootloaderVersion OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
```

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```
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Software bootloader Partnumber of the WAP Unit."
::= { identification 3 }
kernelVersion OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Software kernel Partnumber of the WAP Unit."
::= { identification 4 }
filesystemVersion OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Software file system Partnumber of the WAP Unit."
::= { identification 5 }
modificationsImplemented OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"modifications implemented for the WAP Unit."
::= { identification 6 }
arubaMACaddress OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"aruba mac address associated with WAP Unit."
::= { identification 7 }
arubaName OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"aruba name associated with WAP Unit."
::= { identification 8 }
arubaSerialNumber OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"aruba serial number associated with WAP Unit."
::= { identification 9 }
arubaModel OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"aruba model associated with WAP Unit."
::= { identification 10 }
arubaConfig OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
```

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```
ACCESS read-only
STATUS mandatory
DESCRIPTION
"aruba running configuration associated with WAP Unit."
::= { identification 11 }
SystemConfigVerion OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..255))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"System Configuration file version associated with WAP Unit."
::= { identification 12 }
temperatureHighPCB OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"high controller board temperature of the WAP Unit."
::= { status 1 }
temperatureLowPCB OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"low controller board temperature of the WAP Unit."
::= { status 2 }
temperaturePowrSupply OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"power board temperature of the WAP Unit."
::= { status 3 }
voltage12V OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"12V adc measurement of the WAP Unit."
::= { status 4 }
current12V OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"12V corresponding current measurement of the WAP Unit."
::= { status 5 }
voltage5V OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"5V adc measurement of the WAP Unit."
::= { status 6 }
voltage3V3 OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
```

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```
ACCESS read-only
STATUS mandatory
DESCRIPTION
"3.3V adc measurement of the WAP Unit."
::= { status 7 }
voltage1V5 OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"1.5V adc measurement of the WAP Unit."
::= { status 8 }
voltage1V8 OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"1.8V adc measurement of the WAP Unit."
::= { status 9 }
voltage1V1 OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"1.1V adc measurement of the WAP Unit."
::= { status 10 }
voltageProcessor OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"processor voltage adc measurement of the WAP Unit."
::= { status 11 }
timeStamp OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Current date and time of the WAP Unit."
::= { status 12 }
uptimeWAP OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"uptime of the WAP Unit."
::= { status 13 }
DiscreteInRF OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Discrete Input RF status of the WAP Unit."
::= { status 14 }
DiscreteInPOff OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
```

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```
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Discrete Input Power OFF status of the WAP Unit."
::= { status 15 }
DiscreteInRST OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"reset discrete input status of the WAP Unit."
::= { status 16 }
DiscreteInConfigW1 OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Discrete Config W1 input status of the WAP Unit."
::= { status 17 }
DiscreteOutRF OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DiscreteOutPower OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Discrete Power Output status of the WAP Unit."
::= { status 19 }
DiscreteOutConfigW2 OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Discrete ConfigW2 Output status of the WAP Unit."
::= { status 20 }
loadaverageARM OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"ARM CPU load average of the WAP Unit."
::= { status 21 }
totalHrsOfOperation OBJECT-TYPE
SYNTAX Integer32
ACCESS read-only
STATUS mandatory
DESCRIPTION
"total hrs of operation of WAP Unit."
::= { status 22 }
wapEventNotification NOTIFICATION-TYPE
STATUS current
DESCRIPTION
"this trap is sent by WAP AM335x."
::= { notification 1 }
```

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```
wapEventString OBJECT-TYPE
SYNTAX DisplayString (SIZE (0..10))
ACCESS read-only
STATUS mandatory
DESCRIPTION
"trap notification reason."
 ::= { notification 2 }
END
```