WAM Receiver JSON User Interface Document

Interface Instructions

Overview

Overview:
Java Script Object Notation (JSON) is a text-based human-readable data format that can be used by the Wireless Asset Monitoring (WAM) Receiver Ethernet output. The WAM Receiver is shipped using an ASCII hex format output and must be configured as a JSON format output using the WAM internal web browser as described in the WAM installation sheet. The serial data is then output from the WAM Receiver on the RJ-45 Ethernet connection First In-First Out (FIFO) from the wireless transmitters. The BAS or computer interface then interprets the JSON formatted data. Below are the wireless transmitter types that are received by the WAM and converted into a JSON format output.

Abbreviations Used in this Document:

ASCII.....American Standard Code for Information Interchange
BAS.....Building Automation System
Enum.....Enumeration
FIFO.....First In - First Out
JSON .....Java Script Object Notation
RH.....Relative Humidity
TEMP.....Temperature
WAM .....Wireless Asset Monitoring Receiver (BA/RCV418-WAM)

Transmitter Types and Enumerator Identification

Sales Name	Description	*Device type #	**Enumerator #
^BA/BS2-WT	Room Temp Transmitter	76/75	63
^BA/BS2-WTH	Room Temp & Hum Sensor	76/75	61
^BA/BS2-WT-S	Room Setpoint	76/75	1
^BA/BS2-WT-O	Room Override	76/75	2
BA/WT-(D,I,O)	Duct/Immersion/Outside Air Temp Transmitter	76/75	63
BA/WT-(SL,RPP,TB)	BAPI-Slim/Remote/Thermobuffer Temp Transmitter	76/75	63
BA/WTH-(D,O)	Duct/OSA Temp & RH Transmitter	76/75	61
BA/WFP	Food Probe Temp Transmitter	76/75	6
BA/WAI-05,	Universal Analog Input 0-5V Transmitter	76/75	5
BA/WAI-10	Universal Analog Input 0-10V Transmitter	76/75	3
BA/WAI-420	Universal Analog Input 4-20mA Transmitter	76/75	4
BA/WDI	Universal Digital Input Transmitter	76/75	12
BA/WTS	10K-2 Thermistor Sensor Temp Transmitter	76/75	63
BA/WBB	Break Beam Counter	11/10	None
Point Six	Analog	41/40	None
Point Six	Temperature	54/53	None
Point Six	Humidity	52/51	None

*xx/yy xx = Device ID, yy = Service ID (Used only during push button training.)
**The Enumerator is information built into the data packet to describe range and engineering units. See Table 1
^Can be put into a single sensor for Temp, RH, Setpoint and override

Building Automation Products, Inc., 750 North Royal Avenue, Gays Mills, WI 54631 USA
Tel:+1-608-735-4800 • Fax+1-608-735-4804 • E-mail:sales@bapihvac.com • Web:www.bapihvac.com

JSON Decode Operation Overview

All of the WAM Gateway JSON code is represented as ASCII string with { } separating each transmission packet. The data in the packet is grouped in multiple pairs as "Name" : "Value" for each parameter in the ASCII string. JSON numeric string data is converted to numeric data in the array generated by the JSON decode function.

JSON WAM Gateway Decode Descriptions:
"DeviceType" = "tt" , "SerialNumber" = "nnnnnnnn" , "NumberOutputs" = "x" , "Reading1" = "v" , "Units1" = "txt" , "Enum1" = "e"

Name: DeviceType
Value: tt = Numeric value indicating type of device (11, 41, 52, 54, or 76)

Name: SerialNumber
Value: n = 8 or 16 character unique identifier assigned to each wireless transmitter.

Name: NumberOutputs
Value: x = For device types 52 and 76, this value indicates the number of outputs (1 or 2).

Name: Reading1, Reading2, Reading3, or Reading4
Value: v = The value read from the sensor. Sensors can have up to 4 readings.

Name: Units1 or Units2
Value: txt = A text string that describes what type of engineering unit is applied to the data is being reported. Units1 corresponds to Reading1 and Units2 corresponds to Reading2. See Enumeration Table below.

Name: Enum1 and Enum2
Value: e = This value indicates which enumeration entry from the Enumeration Table below that corresponds to the value that was reported in the data reading. Enum1 (Enum ID) corresponds to the enumeration entry used for Reading1. Enum2 (Enum ID) corresponds to the enumeration entry used for Reading2. By knowing which set of enumeration values correspond to a reading, a programmer can easily determine in software additional information for device type 76 sensors. For example, if the enumeration ID is 6 for a device type of 76, the sensor is a Temperature Food Probe and Reading1 is temperature in degrees centigrade (Units = degC).

Table 1: Enumerator Interpretation Table

Enum #	Units	Description	Range
0	%	Generic	0 to 100
1	%	Setpoint full scale	0 to 100
2	off:on	Override or DI	
3	Volts	Generic Analog	0 to 10
4	mA	Generic Analog	4 to 20
5	Volts	Generic Analog	0 to 5
6	ºC	Temp. food probe	-15 to 110
7	WC	± Pressure WC	-5 to 5
8	WC	± Pressure WC	-1 to 1
9	PSI	± Pressure PSI	-250 to 250
10	CC	Current Count	0 to 4,095
11	FC	Light Level	0 to 2,000
12	off:on	DI (See below)	
58	%	O2 in %	0 to 25
59	ppm	Any gas in PPM	0 to 2,000
60	ºC	Temp.(±200ºC)	-200 to 200
61	%RH	Humidity	0 to 100
62	ºF	Temp.	-40 to 185
63	ºC	Temp.	-40 to 85

JSON Data Stream Examples

The examples below show each transmitter description and the JSON packet stream with its associated array of name value pairs.

• BAPI-STAT 2 ROOM TEMPERATURE TRANSMITTER
(Part #: BA/BS2-WT, Device Type: 76/75, Enumerator #: 63)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"B0242000","NumberOutputs":"1","Reading1":"15.182","Units1":"degC","Enum1":"63"}

JSON Decode:
([DeviceType] =>76 [SerialNumber] =>B0242000 [NumberOutputs] =>1 [Reading1] =>15.182 [Units1] => degC [Enum1] => 63)

Wireless Transmitter Value:
Temperature = 15.18°C

• BAPI-STAT 2 ROOM TEMP & HUMIDITY TRANSMITTER
(Part #: BA/BS2-WTH, Device Type: 76/75, Enumerator #: 63 & 61)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"80148004","NumberOutputs":"2","Reading1":"22.910","Units1":"degC","Enum1":"63","Reading2":"44.66","Units2":"%RH","Enum2":"61"}

JSON Decode:
([DeviceType]=>76[SerialNumber]=>80148004[NumberOutputs]=>2[Reading1]=>22.910[Units1]=>degC[Enum1]=>63[Reading2]=>44.66[Units2]=>%RH[Enum2]=>61)

Wireless Transmitter Value:
Temperature = 22.91°C
Humidity = 44.66%RH

• BAPI-STAT 2 ROOM TEMPERATURE TRANSMITTER WITH SETPOINT AND OVERRIDE
(Part # BA/BS2-WT-SO, Device Type: 76/75, Enumerator #: 01 and 02

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"D8569024","NumberOutputs":"2","Reading1":"51.180","Units1":"%","Enum1":"1","Reading2":"off","Units2":"off/on","Enum2":"2"}

JSON Decode:
([DeviceType]=>76[SerialNumber]=>D8569024[NumberOutputs]=>2[Reading1]=>51.180[Units1]=>%[Enum1]=>1[Reading2]=>off[Units2]=>off [Enum2]=>2)

Wireless Transmitter Value:
Override = Off
Setpoint = 51.18%

• DUCT, IMMERSION OR OUTSIDE AIR TEMPERATURE TRANSMITTER
(Part #: BA/WT-(D,I,O), Device Type: 76/75, Enumerator #: 63)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"B0242001","NumberOutputs":"1","Reading1":"15.180","Units1":"degC","Enum1":"63"}

JSON Decode:
([DeviceType]=>76[SerialNumber]=>B0242001[NumberOutputs]=>1[Reading1]=>15.180[Units1]=>degC[Enum1]=>63)

Wireless Transmitter Value:
Temperature = 15.18°C

• BAPI-SLIM, REMOTE PROBE AND THERMOBUFFER TEMPERATURE TRANSMITTERS
(Part #: BA/WT-(SL,RPP,TB), Device Type: 76/75, Enumerator #: 63)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"B0242002","NumberOutputs":"1","Reading1":"3.340","Units1":"degC","Enum1":"63"}

JSON Decode:
([DeviceType]=>76[SerialNumber]=>B0242002[NumberOutputs]=>1[Reading1]=>3.340[Units1]=>degC[Enum1]=>63)

Wireless Transmitter Value:
Temperature = 3.34°C

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JSON Data Stream Examples continued...

• DUCT AND OUTSIDE AIR TEMPERATURE AND HUMIDITY TRANSMITTERS
(Part #: BA/WTH-(D,O), Device Type: 76/75, Enumerator #: 63 & 61)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"80148006","NumberOutputs":"2","Reading1":"21.560","Units1":"degC","Enum1":"63","Reading2":"45.73","Units2":"%RH","Enum2":"61"}

JSON Decode:
([DeviceType]=>76[SerialNumber]=>80148006[NumberOutputs]=>2[Reading1]=>21.560[Units1]=>degC[Enum1]=>63[Reading2]=>45.73[Units2]=>%RH[Enum2]=>61)

Wireless Transmitter Value:
Temperature = 21.56°C
Humidity = 45.73%RH

• FOOD PROBE TEMPERATURE TRANSMITTERS
(Part #: BA/WFP, Device Type: 76/75, Enumerator #: 06)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"C0644804","NumberOutputs":"1","Reading1":"23.640","Units1":"degC","Enum1":"6”}

JSON Decode:
([DeviceType]=>76[SerialNumber]=>C0644804[NumberOutputs]=>1[Reading1]=>23.640[Units1]=>degC[Enum1]=>6)

Wireless Transmitter Value:
Temperature = 23.64°C

• UNIVERSAL ANALOG INPUT TRANSMITTER, 0-5 VOLT INPUT
(Part #: BA/WAI-05, Device Type: 76/75, Enumerator: 05)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"C0644805","NumberOutputs":"1","Reading1":"2.500","Units1":"Volts","Enum1":"5”}

JSON Decode:
([DeviceType] => 76 [SerialNumber] => C0644805 [NumberOutputs] => 1 [Reading1] => 2.500 [Units1] => Volts [Enum1] => 5)

Wireless Transmitter Value:
Analog = 2.5 volts

• UNIVERSAL ANALOG INPUT TRANSMITTER, 0-10 VOLT INPUT
(Part #: BA/WAI-10, Device Type: 76/75, Enumerator: 03)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"C0644806","NumberOutputs":"1","Reading1":"5.000","Units1":"Volts","Enum1":"3”}

JSON Decode:
([DeviceType] => 76 [SerialNumber] => C0644806 [NumberOutputs] => 1 [Reading1] => 5.000 [Units1] => Volts [Enum1] => 3)

Wireless Transmitter Value:
Analog = 5.0 volts

• UNIVERSAL ANALOG INPUT TRANSMITTER, 4-20 MA INPUT
(Part #: BA/WAI-420, Device Type: 76/75, Enumerator: 04)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"C0644807","NumberOutputs":"1","Reading1":"12.000","Units1":"mAs","Enum1":"4”}

JSON Decode:
([DeviceType] => 76 [SerialNumber] => C0644807 [NumberOutputs] => 1 [Reading1] => 12.000 [Units1] => mA [Enum1] => 4)

Wireless Transmitter Value:
Analog = 12.0 mA

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Building Automation Products, Inc., 750 North Royal Avenue, Gays Mills, WI 54631 USA
Tel:+1-608-735-4800 • Fax+1-608-735-4804 • E-mail:sales@bapihvac.com • Web:www.bapihvac.com

JSON Data Stream Examples continued...

• UNIVERSAL DIGITAL INPUT TRANSMITTER
(Part #: BA/WDI, Device Type: 76/75, Enumerator: 12

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"C0644808","NumberOutputs":"1","Reading1":"1","Units1":"on","Enum1":"12”}

JSON Decode:
([DeviceType] => 76 [SerialNumber] => C0644808 [NumberOutputs] => 1 [Reading1] => 1 [Units1] => off/on [Enum1] => 12)

Wireless Transmitter Value:
Digital closed = 1 on, (“0” would indicate off)

• 10K-2 THERMISTOR SENSOR TEMPERATURE TRANSMITTER
(Part #: BA/WTS, Device Type: 76/75, Enumerator: 63)

JSON ASCII Packet Stream:
{"DeviceType":"76","SerialNumber":"B0242004","NumberOutputs":"1","Reading1":"30.220","Units1":"degC","Enum1":"63"}

JSON Decode:
([DeviceType] => 76 [SerialNumber] => B0242004 [NumberOutputs] => 1 [Reading1] => 30.220 [Units1] => degC [Enum1] => 63)

Wireless Transmitter Value:
Temperature = 30.22°C

• WIRELESS BREAK BEAM COUNTER
(Part #: BA/WBB, Device Type: 11/10, Enumerator: None

JSON ASCII Packet Stream:
{"DeviceType":"11","SerialNumber":"91170078","Reading1":"Open","Reading2":"1210","Reading3":"0","Reading4":"37386"}

JSON Decode:
([DeviceType]=>11[SerialNumber]=>91170078[Reading1]=>Open[Reading2]=>1210[Reading3]=>0[Reading4]=>37386)

Wireless Transmitter Value:
Reading 1: Beam state Open. (Can be Open, Closed, or Blocked)
Reading 2: Cumulated Object counter at 1210. Raps back to zero (0) after 16,777,215 counts.
Reading 3: Fringe Performance Event Counter
Reading 4: Total Blocked Beam Time 37386 seconds

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Specifications

Receiver Pass-through	100ms
Transmitter Interval:	
Typical	10 seconds ±.5 seconds (Standard)
Adjustable	10s to 300s (Selected at time of order)
Transmitter Max	100 transmitters max
Wireless Transmitters Supported:	
Room	BA/BS2-WT(H), BA/BS2-WT(H)-SO
Duct	BA/WT-D-x, BA/WTH-D
OSA	BA/WT-O-BB, BA/WTH-O-BB
Immersion	BA/WT-I-x
BAPI-Slim	BA/WT-SL
Thermobuffer	BA/WT-TB
Remote	BA/WT-RPP
Food Probe	BA/WFP
Analog (V/mA)	BA/WAI-xxx
Digital	BA/WDI
Thermistor	BA/WTS
Break Beam	BA/WBB
Communication Ports:	
USB-B Port	USB-2, 19200 baud
RJ45, 10base –T	Telnet port 1000 or HTTP GET method

JSON Interface Software Acquisition

The JSON interface software can be downloaded from the BAPI website at no cost.
Go to "www.bapihvac.com", click on "Wireless Sensors" then "Receivers" and "WAM Gateway - Wireless Asset Monitoring Receiver". Click on the "Documents" tab then download the JSON Interface Software and Documentation.

Available Documents & Software (Downloads from www.bapihvac.com)

WAM Installation Doc	WAM Installation and Gateway Configurator (RJ45 IP Interface)
WAM Website Doc	Full WAM Website Instructions and User Guide
JSON Interface Doc	Java Script Object Notation (JSON) Gateway interface documentation
Hex Interface Doc	A description of the payload for each transmitter and enumerator identification
TCP IP Discover	IP Search Program Identifies Assigned DHCP Network Address
Receiver Test	Monitor WAM Receiver Data Output (accessed by USB port)
FTDI Drivers	USB Communication Interface

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