WAM Receiver HEX Payload Interface Document

Interface Instructions

Overview - Data Packet Interpretation Process Description

Data Packet Interpretation Process Description

BAPI Receivers and Repeaters receive and process this data packet. The BAPI Receivers and Repeaters perform a CRC-16 error check on the packet. If the data is not accurate it is discarded. When an error-free packet is received, it is converted to a 29-character string and transmitted out the serial port at 19,200 baud. A checksum byte is added so that data is easier to error check. The data is transmitted serially in ASCII Hex format and terminated with a CR character. This format requires two bytes for each byte of data; 14 data bytes x 2 = 28 plus the CR is 29 characters. Below are the descriptions of the BAPI data packets as they come out of the BAPI wireless receiver interface using Ethernet or USB port communication. The serial data uses standard ASCII Hex protocol for easy independent program interface. The serial data is then output from the WAM receiver connection First In-First Out (FIFO) from the wireless transmitters. The BAS or computer interface then interprets the ASCII HEX formatted data. Below are the wireless transmitter types that are received by the WAM receiver (BA/RCV418-WAM) and converted into a ASCII HEX 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
RH.....Relative Humidity
TEMP.....Temperature
WAM BA/RCV418-WAM
Xmtr .....Transmitter
MS.....Most Significant bits/byte
LS .....Least Significant bits/byte
MID .....Middle Significant bits/byte
CR.....Carriage return <CR>

Data Packet Structure

Data Packet Arrangement:

The ASCII Hex data packet is 29 characters in length including the <CR>: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>

Abbreviations and Definitions:

Abbrev.	Description	Definition
	Payload:	All information transmitted in the wireless RF signal
	Data Packet:	The data portion of the information in the wireless payload.
	Enumeration:	Interpretation information built into the data packet for range and engineering units.
	Enumerator:	The number in the data packet telling the interpreting program how to interpret this data packet for range and engineering units.
ID =	Device ID:	This identifies the type of device transmitting in the data packet
SSSSSSSS =	Serial Number:	This is the serial number transmitted in the data packet.
nn =	Enumerator 2:	This ID's the number of I/O points and engineering units and range of Data field 2.
ee =	Enumerator 1:	This ID's the engineering units and range of Data field 1.
aa =	Data field 2:	This is the analog data value for Enumerator 2, in the payload.
AA =	Data field 1:	This is the analog data value for Enumerator 1, in the payload.
CC =	CRC Error check:	Communication error check
KK =	256 sum of data:	Communication checksum of the binary data.
<CR>	Carriage Return	End of data packet

Device ID Convention: All BAPI built transmitters only use 76/75

Convention form: xx/yy
xx = Device ID first
yy = Service ID second and is only used during push button training
Note: The xx first, yy second convention is often violated by Point Six in their literature.

Device ID	Internal Name	SN	Products	BAPI Products
11/10	IR Beam Counter	8	Point Sensor IR Counter	BA/WBB (Supplied by Point Six)
74/73	Count Analog	8	Point sensor Magnetic Door	BA/WDS (Supplied by Point Six)
76/75	Dual Analog	8	Point sensor RTD	+All BAPI built transmitters

+BAPI Output modules can act on ID# 76/75. BAPI supported transmitters use Device ID's 76/75, 74/73, 11/10.

Data Packet Structure continued...

Serial Number Convention:
BAPI receivers use the Point Six 8-byte serial number convention. Point Six also has a 16-byte convention which is not compatible with the BAPI output module system but can be used with BAPI's wireless receivers for computer interface and BAPI's SQL database software.

Serial Number Byte Structure: Dates are the Manufacturing Program date, Serial 0-1024 for each day.

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8, 2bits
Date	Month MS	Month LS	Day MS	Day LS	Serial MS	Serial Mid	Serial LS

BAPI Enumerator Engineering Unit Definitions: Enumerator codes are used in all BAPI products shipped after 3-1-10 and will conform with the following Device Id and enumerator codes in table 1.

Table 1: Transmitter Device Types and Enumerator Identification

Part Number	Description	*Device type #	**Enumerator #
^BA/BS2-WT	Room Temp Xmtr	76/75	63
^BA/BS2-WTH	Room Temp & Hum Sensor	76/75	61
^BA/BS2-WT-S	Room Setpoint	76/75	01
^BA/BS2-WT-O	Room Override	76/75	02
BA/WT-(D, I, O)	Duct/Immersion/OSA Temp Xmtr	76/75	63
BA/WT-(SL, RPP, TB)	Slim/Remote/Thermobuffer Temp Xmtr	76/75	63
BA/WTH-(D, O)	Duct/OSA Temp & RH Xmtr	76/75	61
BA/WFP	Food Probe Temp Xmtr	76/75	06
BA/WAI-05	Analog input 0-5V Xmtr	76/75	05
BA/WAI-10	Analog input 0-10V Xmtr	76/75	03
BA/WAI-420	Analog input 4-20mA Xmtr	76/75	04
BA/WDI	Digital Input Transmitter	76/75	12
BA/WTS	10K-2 Thermistor Sensor Temp Xmtr	76/75	63
BA/WBB	Break Beam Counter	11/10	None
BA/WDS	Magnetic Door Switch Counter	74/73	None

* xx/yy xx = Device ID, yy = Service ID is used during push button training.
** The Enumerator is information built into the data packet to describe range and engineering units. See Table 2.
^ Can be put into a single sensor for Temp, RH, Setpoint and Override.

Table 2: BAPI Enumerator Engineering Unit Definitions:

Enum #	Bin 1	Eng1	Bin2	Eng2	*Scale	**Offset	Units	Description
00	0	0	4095	100	02442	0	%	Generic
01	0	0	4064	100	0246062	0	%	Set Point full scale
02	F00D	0	FEED	1	1	0	off:on	Override or DI
03	0	0	4095	10	002442	0	Volts	Generic Analog
04	0	4	4095	20	.0039072	4	mA	Generic Analog
05	0	0	4095	5	.001221	0	Volts	Generic Analog
06	0	-15	4095	110	.030525	-15	ºC	Temp. food probe
07	0	-5	4095	5	.002442	-5	WC	± Pressure WC
08	0	-1	4095	1	.0004884	-1	WC	± Pressure WC
09	0	-250	4095	250	.1221	-250	PSI	± Pressure PSI
10	0	0	4095	4095	1	0	CC	Current Count
11	0	0	4095	2000	.4884	0	FC	Light Level
12	0000	0	0001	1	1	0	off:on	DI (See table 3 below)
58	0	0	4095	25	.00610	0	%	O2 in %
59	0	0	4095	2000	.4884	0	ppm	Any gas in PPM
60	0	-200	4095	200	.09768	-200	ºC	Temp.(±200ºC)
61	0	0	4095	100	.02442	0	%RH	Humidity
62	0	-40	4095	185	.054945	-40	ºF	Temp.
63	0	-40	4095	85	.030525	-40	ºC	Temp.

*Scale Calc = (Eng2-Eng1) / (Bin2-Bin1)
**Offset Calc = 0 + Eng1
Example: Payload x Enumerator Scale = Interim Value + Enumerator Offset = Value in Enumerator Engineering Units
Enum #04 Example: 1,000 x .0030972 = 3.9072 + 4 = 7.9072 mA

Data Packet Structure continued...

Table 3: Enumerator 12 payload description for 1 Digital input point

Ana 1 Payload>	A A A A	A A A A	A A A A	A A A A	
Point # >>>	Always 0	Always 0	Always 0	4 3 2 1	0 = Off, 1=On
Pt. 1 Off	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	
Pt. 1 On	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 1	

Calculating the Enumerators, "nn" and "ee"

Determining the enumerator number requires a HEX to Binary calculation. Below is a step by step process to determine the enumerator.

Enumerator 2: nn

Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). 1 for one I/O point, 2 for two I/O points. They are not part of the action steps 1-5 below. That's why you shift the results by 2 bits (step 4) to complete the calculation.

Bits 2-7: Enumerated Engineering units for the 2nd reading. Bits 2-7 of the "nn" section indicate the enumerator for the second reading. 00 would be the default value.

Step	Action
1	Convert the hex value of "nn" to binary.
2	BitAnd the converted binary with 252 in binary.
3	The result is bits 2-7 of the enumerator.
4	Shift the result 2 bits right to make the bits 0-5 of the byte.
5	Convert from binary to decimal. This is your enumerator number.

Enumerator 1: ee (00 would be the default generic enumerator value.)

Bits 0-5 of "ee" is the enumerator for the first reading. Bits 6 and 7 are reserved and always 0.

Step	Action
1	Convert the hex value of "ee" to binary.
2	BitAnd the converted binary with 63 in binary.
3	The result is bits 0-5 of the enumerator.
4	Convert from binary to decimal. This is your enumerator number.

Example Datapacket: 76911D700CF63F06410815D47A87

nn: F6 = 11110110

ee: 3F = 00111111

Enumerator 2 = 61

Step	Action	
1	Convert the hex F6 to binary:	11110110
2	Bit And the binary with 252 binary	11111100
3	Binary result	11110100
	Note: The Binary result are bits 2-7 of the enumerator. You must shift the digits two bits to the right to make them bits 0-5 of the enumerator.	
4	Shift two bits right	00111101
5	Convert to decimal	61

Enumerator 1 = 63

Step	Action	
1	Convert the hex 3F to binary	00111111
2	Bit And the binary with 63 binary	00111111
3	Binary result	00111111
4	Convert to decimal	63

HEX Payload Examples by Product Name

SINGLE ANALOG TEMPERATURE (76/75)

BA/BS2-WT	Room Temp. Transmitter
BA/WT-D	Duct Temp. Transmitter
BA/WT-I	Immersion Temp. Transmitter
BA/WT-O	OSA Temp. Transmitter
BA/WTS	Any 10K-2 Thermistor Sensor Transmitter
BA/WT-TB	Thermobuffer Temp. Transmitter
BA/WT-RPP	Remote Probe Temp. Transmitter
BA/WT-SL	Slim Temp. Transmitter

Operation: These units transmit a new Temperature value payload at intervals of every 10 seconds.
The WT-SL "Slim" has interval times of ≈30 seconds.
Shorter interval times will affect battery life.
All transmitters can have variable interval times from 10 seconds to 10 minutes.

Typical payload and description below: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >76
The device type field: Multi-Analog has device type 76 hex. A 75 hex when in service mode.
"SSSSSSSS" >Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the Multi-Analog device. The LS-2 bits are set to zero.

"nn" >00
Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). Bits 2 –7: enumerated Engineering units for 2nd Analog. See the section "Enumerated Engineering Units" for more information.

"ee" >63
Bits 0-5: enumerated Engineering units for 1st Analog. See Tables 1 and 2 for more information. Bits 6 and 7: reserved (always 0).

"aaaa" >0000 (Not used)
This is the second analog data field and is populated when the number of I/O points is 2. This field is assigned 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"AAAA" >Temperature value
This is the first analog data field and always exists. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"CCCC" >Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

MULTI-ANALOG (TEMP. W/SETPOINT AND/OR OVERRIDE) (76/75)

BA/BS2-WT-(S, SO) Room Temp. Sensor w/setpoint and/or override

Operation: These units alternate payloads on each transmission between the Temperature and the combined Setpoint/ Override.
1st transmission is the Temperature value (A)
2nd transmission is the combined Setpoint value (a) and Override interrupt(A)
All transmitters can have variable interval times from 10 seconds to 10 minutes.
Also to better the odds that a transmitted override signal is received, the transmitter will immediately transmit a setpoint/override packet twice when the override pushbutton is pressed.

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HEX Payload Examples by Product Name, ("aa" and "AA") continued...

MULTI-ANALOG (TEMP. W/SETPOINT AND/OR OVERRIDE) (76/75) continued...

Typical payload and description below: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >76
The device type field: Multi-Analog has device type 76 hex. A 75 hex when in service mode.

"SSSSSSSS" > Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the Multi-Analog device. The LS-2 bits are set to zero.

"nn" >1st transmission 00 >2nd transmission 02
Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). Bits 2 –7: enumerated Engineering units for 2nd Analog. See the section "Enumerated Engineering Units" for more information.

"ee" >1st transmission 63 >2nd transmission 01
Bits 0-5: enumerated Engineering units for 1st Analog. See Tables 1 and 2 for more information. Bits 6 and 7: reserved (always 0).

"aaaa" >1st transmission 0 >2nd transmission Override Interrupt Button
This is the second analog data field and is populated when the number of I/O points is 2. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"AAAA" >1st transmission Temp Value >2nd transmission Setpoint Value
This is the first analog data field and always exists. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"CCCC" >Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

MULTI-ANALOG (TEMP. AND HUMIDITY) (76/75)

BA/BS2-WTH	Room Temp.& Hum. Sensor
BA/WTH-D	Duct Temp. & Hum Transmitter
BA/WTH-O	OSA Temp. & Hum Transmitter

Operation: These units transmit the combined Temperature/Humidity in a single transmission.
1st transmission is the combined Humidity value (a) and the Temperature value (A)
All transmitters can have variable interval times from 10 seconds to 10 minutes.

Typical payload and description below: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >76
The device type field: Multi-Analog has device type 76 hex. A 75 hex when in service mode.

"SSSSSSSS" >Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the Multi-Analog device. The LS-2 bits are set to zero.

"nn" >61
Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). Bits 2 –7: enumerated Engineering units for 2nd Analog. See the section "Enumerated Engineering Units" for more information.

"ee" >63
Bits 0-5: enumerated Engineering units for 1st Analog. See Tables 1 and 2 for more information. Bits 6 and 7: reserved (always 0).

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HEX Payload Examples by Product Name, ("aa" and "AA") continued...

MULTI-ANALOG (TEMP. AND HUMIDITY) (76/75) continued...

"aaaa" >Humd. value
This is the second analog data field and is populated when the number of I/O points is 2. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"AAAA" >Temp. value
This is the first analog data field and always exists. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"CCCC" >Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

MULTI-ANALOG (TEMP & RH & SETPOINT AND/OR OVERRIDE) (76/75)
BA/BS2-WTH-(S, SO) Room Temp. & Hum. Sensor w/setpoint and/or override

Operation: These units alternate payloads on each transmission between the combined Temperature/Humidity and the combined Setpoint/Override.
1st transmission is the combined Humidity value (a) and the Temperature value (A)
2nd transmission is the combined Setpoint value (a) and Override interrupt(A)
All transmitters can have variable interval times from 10 seconds to 10 minutes.

Typical payload and description below: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >76
The device type field: Multi-Analog has device type 76 hex. A 75 hex when in service mode.

"SSSSSSSS" >Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the Multi-Analog device. The LS-2 bits are set to zero.

"nn" >1st transmission 61 >2nd transmission 02
Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). Bits 2 –7: enumerated Engineering units for 2nd Analog. See the section "Enumerated Engineering Units" for more information.

"ee" >1st transmission 63 >2nd transmission 01
Bits 0-5: enumerated Engineering units for 1st Analog. See Tables 1 and 2 for more information. Bits 6 and 7: reserved (always 0).

"aaaa" >1st transmission Humd. Value >2nd transmission Override Interrupt Button
This is the second analog data field and is populated when the number of I/O points is 2. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"AAAA" >1st transmission Temp. value >2nd transmission Setpoint Value
This is the first analog data field and always exists. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"CCCC" >Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

HEX Payload Examples by Product Name, ("aa" and "AA") continued...

SINGLE ANALOG TEMPERATURE (76/75)

BA/WFP Food Probe Temperature Transmitter

Operation: These units transmit a new analog value payload at intervals of every 30 seconds.
Shorter interval times will affect battery life.
All transmitters can have variable interval times from 10 seconds to 10 minutes.

Typical payload and description below: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >76
The device type field: Multi-Analog has device type 76 hex. A 75 hex when in service mode.

"SSSSSSSS" > Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the Multi-Analog device. The LS-2 bits are set to zero.

"nn" >00
Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). Bits 2 –7: enumerated Engineering units for 2nd Analog. See the section "Enumerated Engineering Units" for more information.

"ee" >06
Bits 0-5: enumerated Engineering units for 1st Analog. See Tables 1 and 2 for more information. Bits 6 and 7: reserved (always 0).

"aaaa" >0000 (Not used)
This is the second analog data field and is populated when the number of I/O points is 2. This field is assigned 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"AAAA" >Analog value
This is the first analog data field and always exists. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"CCCC" >Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

SINGLE ANALOG SIGNAL INPUT (76/75)

BA/WAI-10 Analog input 0-10V
BA/WAI-05 Analog input 0-5V
BA/WAI-420 Analog input 4-20mA

Operation: These units transmit a new analog value payload at intervals of every 10-11 seconds.
All transmitters can have variable interval times from 10 seconds to 10 minutes.

Typical payload and description below: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >76
The device type field: Multi-Analog has device type 76 hex. A 75 hex when in service mode.

"SSSSSSSS" >Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the Multi-Analog device. The LS-2 bits are set to zero.

"nn" >00
Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). Bits 2 –7: enumerated Engineering units for 2nd Analog. See the section "Enumerated Engineering Units" for more information.

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HEX Payload Examples by Product Name, ("aa" and "AA") continued...

SINGLE ANALOG SIGNAL INPUT (76/75) continued...

"ee" >(ee=05 for BA/WAI-05), (ee=03 for BA/WAI-10), (ee=04 for BA/WAI-420)
Bits 0-5: enumerated Engineering units for 1st Analog. See Tables 1 and 2 for more information. Bits 6 and 7: reserved (always 0).

"aaaa" >0000
This is the second analog data field and is populated when the number of I/O points is 2. This field is assigned 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"AAAA" >Analog value
This is the first analog data field and always exists. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"CCCC" >Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

SINGLE DIGITAL INPUT (76/75)

BA/WDI Digital Input Status Transmitter

Operation: These units transmit a new status digital value payload at intervals of every 10-11 seconds. All transmitters can have variable interval times from 10 seconds to 10 minutes.

Typical payload and description below: IDSSSSSSSSnneeaaaaAAAACCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >76
The device type field: Multi-Analog has device type 76 hex. A 75 hex when in service mode.

"SSSSSSSS" > Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the Multi-Analog device. The LS-2 bits are set to zero.

"nn" >00
Bits 0 and 1: The number of I/O points (1 byte field: 1 or 2). Bits 2 –7: enumerated Engineering units for 2nd Analog. See the section "Enumerated Engineering Units" for more information.

"ee" >12
Bits 0-5: enumerated Engineering units for 1st Analog. See Tables 1 and 2 for more information. Bits 6 and 7: reserved (always 0).

"aaaa" >0000
This is the second analog data field and is populated when the number of I/O points is 2. This field is assigned 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"AAAA" >Digital value, 0000 = Off, 0001 = On
This is the first analog data field and always exists. This field is signed 16 bits stored MSB first (bits 15-8) and LSB last (bits 7-0) from left to right. This field has a possible range of –32768 to 32767. This is a general purpose field and may contain 8 bit or 12 bit data.

"CCCC" >Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

HEX Payload Examples by Product Name, ("aa" and "AA") continued...

X2 OBJECT COUNTER IR BEAM (11/10)
BA/WBB Break Beam Counter

Operation: These units transmit a new count value payload at intervals of every 10-11 seconds.

Typical payload and description below: IDSSSSSSSSooooooffggggCCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >11
The device type field: Multi-Analog has device type 11 hex. A 10 hex when in service mode.

"SSSSSSSS" > Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the sensor.
The LS-2 bits are the status flags for the open and closed beam status.
An Open beam exists whenever the beam cannot be seen.
A Closed beam exists whenever the beam can be seen.

The LS bit (bit-0) is the Open beam state flag and the next most significant bit (bit-1) is the Closed beam state flag. Whenever both these bits are low a BLOCKED state exists. Blocked occurs whenever the IR beam is blocked (Open) for more than 6.5 seconds.

"oooooo" >Hex counter value. This value raps back to 00 after I gets to a max count
This 24-bit field is the Object Counter stored LS-byte first. The counter accumulates switch openings up to 33,488,895 counts in decimal and then raps to zero to start the count over.

"ff" >Alignment indication counter (00 indicates proper alignment)
This 8-bit field is the Fringe Performance Event Counter. A non-zero value in this field indicates that fringe IR reception exists and should be corrected for proper performance of the counter. This count returns to zero when proper alignment exists.

"gggg" >Blocked IR beam time counter
This 16-bit field is the Total-Blocked-Time in accumulated seconds stored LS-byte first.
This counter accumulates the total time the beam has been blocked in seconds up to 65,535 and raps to Zero at the end. It is cleared to zero when the object counter is cleared.

"CCCC" >Cyclic Redundancy Check (CRC) checksum, Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with but not including CRC-16.

"KK" >Check Sum. Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

STATUS & COUNTER DOOR SWITCH (74/73)
BA/WDS Magnetic Door Switch & Counter

Operation: These units transmit a new analog value payload at intervals of every 10-11 seconds.

Typical payload and description below: IDSSSSSSSSooooootttttLLCCCCKK<CR>
Note: All fields are in ASCII Hex

"ID" >74
The device type field: Multi-Analog has device type 74 hex. A 73 hex when in service mode.

"SSSSSSSS" > Address Changes w/ each unit (Unique for each wireless transmitter)
The MS-30 bits of these 4-bytes are the serial number of the CountTemp.
The LS-2 bits are the status flags for the open and closed switch input status.
"Bit-0" is the Open status flag and "Bit-1" is the Closed status flag.

"oooooo" >Hex counter value. This value raps back to 00 after I gets to a max count
This 24-bit field is the Open counter stored LS-byte first. The counter accumulates switch openings up to 33,488,895 counts in decimal and then raps to zero to start the count over.

Continued on next page...

HEX Payload Examples by Product Name, ("aa" and "AA") continued...

STATUS & COUNTER DOOR SWITCH (74/73) continued...

"tttt" >Temperature field. (Not usually used in BAPI systems)
This top 16 bit of this 24-bit field is Temperature in two's compliment 16-bit data stored MSB first in 1/16 deg. C units. The least significant 8 bits of the 24-bit field are zero.

"LL" >Not used. Always 00
This field is unused and will always read zero.

"CCCC" >Cyclic Redundancy Check (CRC) checksum, Changes depending on the data
This field is the CRC-16 error check as was originally received and checked. This CRC is over the first 11 bytes of the packet starting with the device type and ending with inclusion of the "cccccc" data.

"KK" >Check Sum. Changes depending on the data
This field is the mod 256 sum of all the binary data values as represented by the ASCII hex values in the response but does not include the <CR>.

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

Communication Ports:

USB-B Port	USB-2, 19200 baud
RJ45, 10base –T	Telnet port 1000 or HTTP GET method

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
Slim	BA/WT-SL
Buffer	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

Interface Software Acquisition

Go to the BAPI website at www.bapihvac.com
Then go the Wireless Section under the Receivers group and look for the WAM receiver.
Then go to the documents section to acquire the interface documentation.

Available Documents & Software: Downloads from 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