Software Document

INTREPID™ Polling Protocol II: Customer Development

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Contents

Introduction

The INTREPID™ Polling Protocol II, (IPP II) standard developed by Southwest Microwave Inc. (SMI) is an application layer protocol that provides Master/Slave communications between control equipment and SMI INTREPID Polling Protocol II sensors & peripherals. This standard is specific to serial line communications. This protocol uses a packet/frame format to send/receive messages between a master and a slave. This specification should be used by system designers who want to develop their own interfaces to SMI IPP II products.

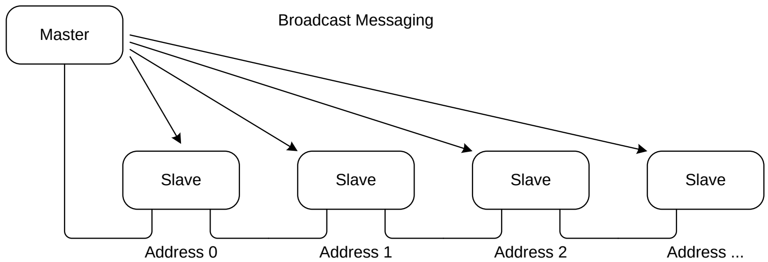
IPP II Master/Slave Protocol Principle

IPP II is a Master/Slave protocol over a serial line. A single master is connected to a bus and up to 16 slaves may be connected to the same bus. All communication is initiated by the master. Polling occurs at a rate of one slave every 125 ms (16 slaves will require 2 seconds for a complete system poll, 8 devices will require 1 second). Slave nodes may never communicate with another slave nor shall a slave transmit data without first receiving a request from the master. Only one (1) master is permitted per bus. Large systems may include several masters, each managing a single bus, reporting the slave data to other applications.

Message Types

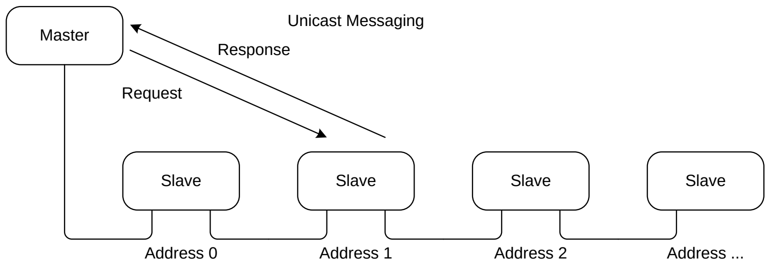
A master may issue two (2) types of messages: Broadcast or Unicast

Broadcast Messaging



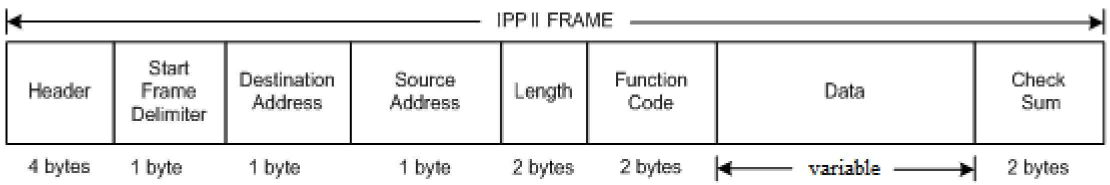
Broadcast Messages are messages issued by the master node to all slave devices on a bus. Broadcast messages are not address specific. All devices on the bus must accept broadcast messages. The slaves do not reply.

Unicast Messaging



Unicast Messages are messages issued by the master node to an individual slave/node. The slave, once the received message validity is determined, processes the request and returns a response back to the master. Invalid messages received by the slave are discarded and no response is generated. Unicast messages are address specific. The Master may issue a message to a Slave device in which no response is generated rather an action is preformed.

INTREPID Polling Protocol II Frame



Field Descriptions:

Header

The header is composed of 4 bytes set to a constant of value 0xFF.

Start Frame Delimiter, (SFD)

The start frame delimiter byte defines the start of the frame. This value is a constant, 0xFE.

Destination Address

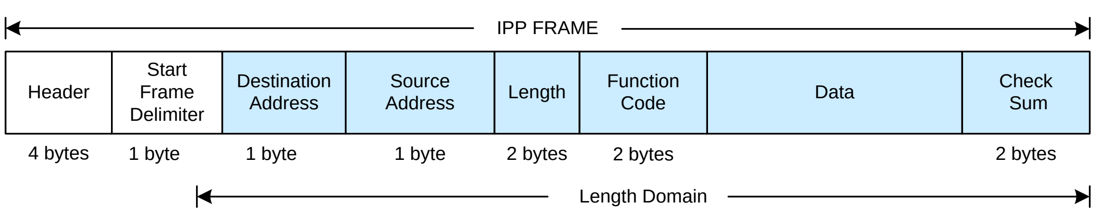
The destination address is defined as a single byte and identifies the destination for the message.

Source Address

The source address is defined as a single byte and identifies originator of the message.

Length

The length field specifies the length of the frame, defined as the sum of the lengths of the destination address, source address, length, function code, data, and checksum fields. This value is expressed as a signed 16-bit value. The minimum value is 8 (0x0008). The maximum value is 288 (0x0120). See details for each function code.



Length Field Domain

Function Code

This two byte field indicates the type of operation to be performed. See details for each device.

Data (Protocol Data Unit, PDU)

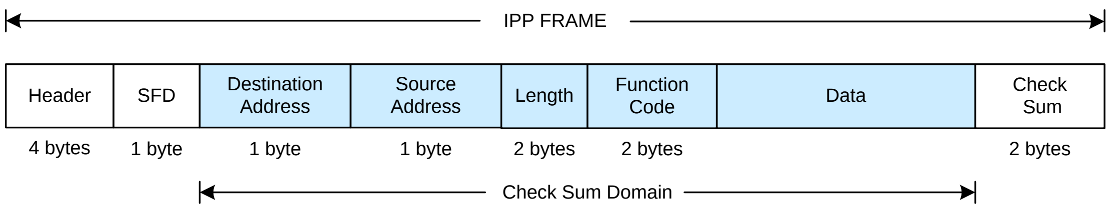
Payload data: 0 – 280 (0x0118) bytes. See details for each device.

Checksum

The checksum field provides a simple redundancy check to ensure frame integrity. Any node that receives a frame that has a bad checksum should be discarded. The one's complemented checksum is verified using the following steps:

Initialize the checksum variable to zero.

Sequentially add the bytes over the checksum domain to the checksum variable, discarding the carry bit.
Once this 16-bit checksum has been determined, complement this value to determine the one's complement.
This value is then compared to the received value of the checksum of frame, discarding the frame data if the values are not equal.



Checksum Field Domain

IPP II Address Space

One byte is used to define an address. All devices, including the master have a defined address. The 256 possible addresses are defined as follows:

Address (Dec)	Address (Hex)	Definition
0 - 239	0x00 - 0xEF	Slave address space
240 - 251	0xF0 - 0xFB	Reserved
252	0xFC	Installation Service Tool
253	0xFD	Test Node
254	0xFE	Poll master
255	0xFF	Broadcast address

The broadcast address, 0xFF, is recognized by all slave devices on a bus.

When developing a Poll Master the source address of 254 (0xFE) should be used. The Poll Master may send unicast messages addressed to specific slave in the address space of 0-239 (0x00 – 0xFE) or a broadcast message, 255 (0xFF) to all devices.

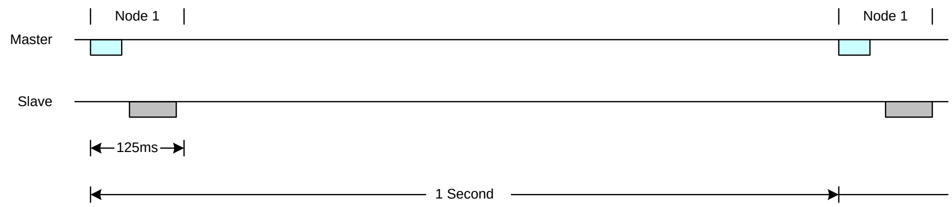
Example:

A transmission from the Poll Master to a slave device, addressed as 11 (0x0B), would have a source address of 0xFE and destination address of 0x0B. Should the slave respond, the Poll Master would receive a message with a source address of 0x0B and a destination address of 0xFE.

Polling a Slave Device

Polling a Single Slave on a Bus

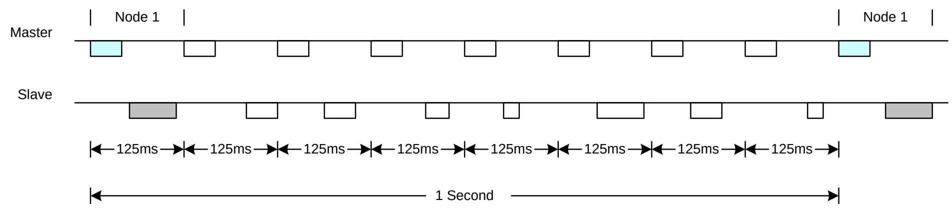
With a single slave on a bus the Master/Slave timing frame relationship must be maintained. A slave node should not be polled at any rate faster than 1 poll/second.



Timing Diagram – Polling a single slave on a bus

Polling Multiple Slaves on a Bus

With multiple slaves on a bus, the Master will poll them sequentially, while still maintaining the rule that a slave should not be polled faster than once per second.

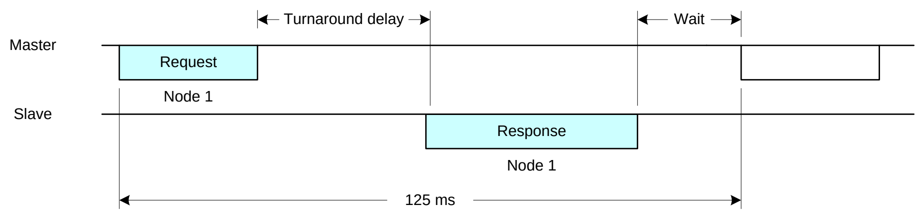


Timing Diagram – Polling 8 slaves on a single bus

Master/Slave Frame Timing Diagrams

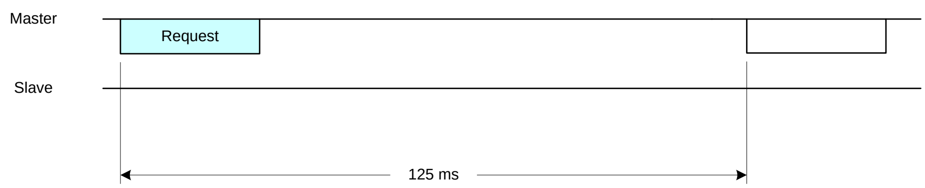
Master/Slave Timing Diagram – Valid Transaction

The following shows a single valid transaction between a master and a slave. The transaction must be completed within 125ms. Once the master has received the response from a slave it must wait until the 125ms has elapsed before starting a new transaction.



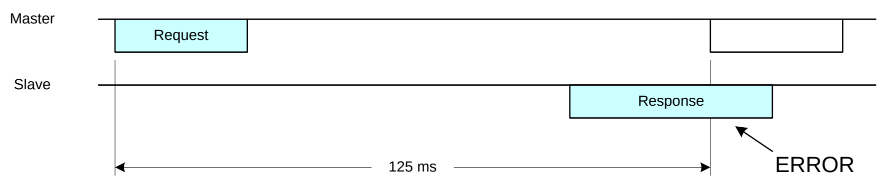
Master/Slave Timing Diagram – No Response Error

No Response – This error may be caused by loss of power to the slave or a broken communications line.



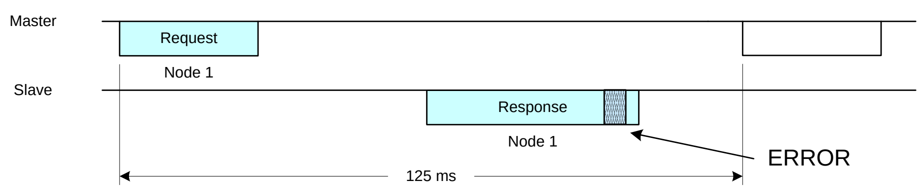
Master/Slave Timing Diagram – Frame over run Error

Timing Error – Frame over run error – This error may be due to too much delay in the communications path.



Master/Slave Timing Diagram – Packet Frame Error

Packet Frame Error – This error may be caused by a corrupted response packet due to noise on the communication line.



Transmission and Reception of Frames

<u>Transmission of Frames</u>

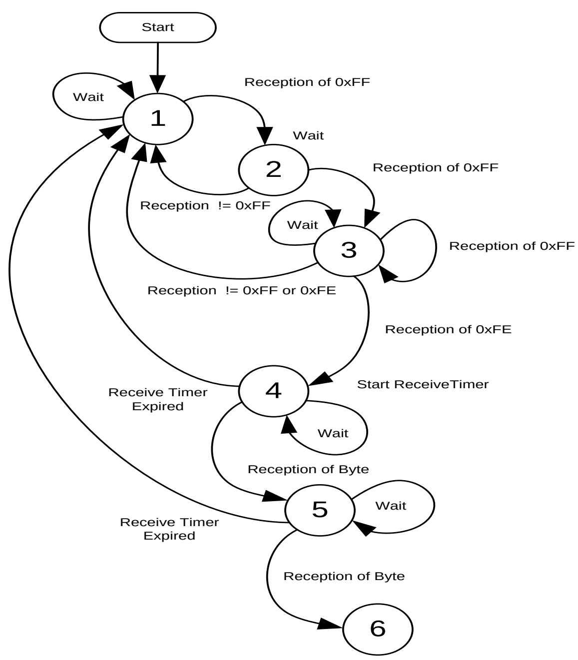
The transmission of a frame always begins with 4 Header bytes followed by the Start Frame Delimiter. This sequence is as follows: 0xFF, 0xFF, 0XFF, 0XFF, 0XFE.

Reception of Frames

The reception of a frame is determined by the presence of at least two Header bytes followed by a Start Frame Delimiter. Three classes have been defined as to how strict the packet reception algorithm should evaluate the Header bytes & Start Frame Delimiter before declaring the reception of a frame.

Class	Header, Start Frame Delimiter sequence	Detection Type
I	0xFF, 0xFF, 0XFF, 0XFF, 0XFE	Strict – Direct Connections
II	0xFF, 0XFF, 0XFF, 0XFE	
III	0XFF, 0XFF, 0XFE	Moderate

IPP II slave devices use Class III detection to determine the reception of a frame. Once a valid Header/Start Frame Delimiter sequence has been detected a countdown timer is set to 125ms and enabled. Should a valid checksum be detected in the packet reception while the timer has not expired, the timer should be disabled. If the timer expires, the state machine for the packet reception should be reset to the start and any data collected should be discarded. Additionally, after each byte is received, the error conditions of the UART should be logged. If any error conditions occur, the state machine should be reset and any data discarded at the timer expiration. It should be noted that regardless of the class of operation, the definition is the minimum number of Header bytes needed prior to the reception of a Start Frame Delimiter to declare the reception of a frame.



Reception State Diagram

Startup Sequence

The following sequence of operations will show the steps required to implement an IPP II system.

STEP 1: Refer to the Installation Manuals for the individual Sensors and Devices. Ensure that each one is properly configured and has been uniquely addressed to match your configuration.

STEP 2: Ensure that the communications line is properly connected between each device and connected to your poll master.

STEP 3: Power up the system.

STEP 4: Issue the Flush Slave Communication Buffers command as a Broadcast Message to all devices. Allow 1 second for the flush to complete before proceeding.

STEP 5: To begin the polling routine, send a Get Slave Node Info to each valid address and record the Function Code needed to poll that address. Once all addresses have been queried and all the Function Codes retrieved for each address, sequentially poll each address with the Function Code associated with that address. Continue the polling routine indefinitely.

System Function Codes

System polling commands are supported by all SMI devices

Function Code	Description	Operation
0x0000	Ping Request/Response Frame Descriptions	Test/Development
0x0002	Reboot Slave	Test/Development
0x0003	Flush Slave Communication Buffer	Test/Development
0x0006	Get Slave Node Information	Normal - Startup
0x0007	Set Slave ID Tag	Utility
0x0008	Get Slave Real Time Clock	Utility
0x0009	Set Slave Real Time Clock	Utility

As presented in the above table, three types of operations may be performed with the various function codes. The Test/Development operations are useful when developing the initial software to verify connection to a particular device. The Ping request is valuable to determine if a device is reachable. The Reboot Slave & Flush Slave Communications Buffer operations are used to set the system into a known state.

The Utility operations are useful in setup. Devices which are not supported by the Universal Installation/Service Tool

The Normal – Startup operation is necessary to determine how a device is to be polled.

Function Code Convention

This document references bit defined elements within data bytes. The convention used within this document is that the LSB of a byte refers to the lowest numbered element and the MSB of the byte refers to the highest numbered element. This is the default convention and should be used unless otherwise stated within a function code.

Example: If a byte references subcells 31...24 or alternatively subcells 24...31, the bit/element relationship is the same. The LSB of the byte is subcell 24 and the MSB of the byte would be subcell 31. The remaining subcell values are linearly distributed within the byte. The smaller value the subcell the closer that subcell is to the processor.

SOUTHWEST MICROWAVE

0x0000

Ping Request/Response Frame Descriptions

Type: System Message

Mode: Unicast

Request:

The Ping request frame is transmitted by a poll master, UIST II, or evaluation software to determine whether or not the communication link between the poll master and slave is operational.

FUNCTION CODE = 0 (0x0000)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

A valid Ping response frame indicates that the communication link is operational on that bus.

FUNCTION CODE = 0 (0x0000)
LENGTH = 8 (0x0008)

Response Payload: None

0x0002

Reboot Slave Request Frame Description

Type: System Message

Mode: Unicast or Broadcast

Request:

The Reboot Slave request frame is transmitted by a poll master, UIST II, or evaluation software to reboot a slave device. The poll slave MUST terminate all communications with the poll Master and perform a reboot operation. This frame may be transmitted in broadcast or unicast mode. It is up to the software that issued the reboot request to re-establish communication with the slave after waiting the appropriate time for the slave to complete the boot cycle.

FUNCTION CODE = 2 (0x0002)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

No response generated.

0x0003

Flush Slave Communication Buffers Request Frame Description

Type: System Message

Mode: Unicast or Broadcast (0xFF)

Request:

The Flush Slave Communication Buffers request frame is typically transmitted by a poll master to inform either a single or multiple slaves connected on a polling protocol network to flush and reset their communication queues. BROADCAST and UNICAST addressing supported. Any pending frames in the slave node’s communications queues are lost.

FUNCTION CODE = 3 (0x0003)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

No response generated.

0x0006

Get Slave Node Information Request/Response Frame Descriptions

Type: System Message

Mode: Unicast

Request:

The Get Slave Node Information request frame is transmitted by a poll master, UIST II, or evaluation software to retrieve a device polling protocol control parameters and node information. The poll master shall transmit this frame at system startup in order to build its network connectivity table defining all the poll slaves installed on the polling protocol network bus.

FUNCTION CODE = 6 (0x0006)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

The Get Slave Node Information request frame returns the required FUNCTION CODE required to poll the node for alarms, the MAC address, and the customer defined ID tag.

FUNCTION CODE = 6 (0x0006)
LENGTH = Variable, 17 to 81 (0x0011 to 0x0051)

Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Slave Poll Request FUNTION CODE	2	0x0100	0xFFFF
2	Slave Node MAC Address	6	-	-
8	Slave Node ID Tag (ASCII)	Variable, 1 to 65	-	-

The Slave Poll request FUNCTION CODE is the required FUNCTION CODE to poll this slave to obtain alarm and tamper information.

MAC Address – 6 Byte, Unique Value

ID Tag – 65 byte user defined null terminated ASCII string (0 to 64 characters, followed by null)

0x0007

Set Slave ID Tag Request/Response Frame Descriptions

Type: System Message

Mode: Unicast

Request:

The Set Slave ID Tag request frame is transmitted by a poll master, UIST II, or evaluation software to write the customer defined ID Tag field in the slave device. This 65-byte, maximum length field is used by the customer to identify a slave node over the network. Examples of customer names are: ‘MicroTrack Processor – North Side”, “Relay Output Module – Guard Shack”, etc. Once the message is received, the slave device shall write the 65-byte field to non-volatile memory. Note: The device needs to verify the requestor’s tag name does not exceed 65 bytes. If the requestor’s tag name is longer than 65 bytes only 65 (null termination character included) bytes shall be accepted by the device.

FUNCTION CODE = 7 (0x0007)
LENGTH = Variable, Max. 73

Request Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Slave Node ID Tag (ASCII)	Variable, 65 Max	-	-

Response:

The Set Slave ID Tag response frame shall transmit the 65 byte null terminated ascii tag name data field which has been read from non-volatile memory after the write is complete from the request frame.

FUNCTION CODE = 0x0007
LENGTH = Variable, Max. 73

Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Slave Node ID Tag (ASCII)	Variable, 65 Max	-	-

0x0008

Get Slave Real Time Clock Request/Response Frame Descriptions

Type: System Message

Mode: Unicast

Request:

The Get Slave Real Time Clock request frame is transmitted by a poll master, UIST II, or evaluation software to get the time and date of a slave. The poll slave shall send the slave real time clock value.

FUNCTION CODE = 8 (0x0008)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

The Get Slave Real Time Clock response is transmitted by a poll slave in response to a previously issued Get Slave Real Time Clock request frame. The slave device shall return either the current real time clock value or an empty packet if this function is not supported.

FUNCTION CODE = 0x0008
LENGTH = 8 (0x0008), (Real Time Clock Not Supported)
LENGTH = 15 (0x000F), (Real Time Clock Supported)

Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	MM - Month	1	1	12
1	DD - Day of Month	1	1	31
2	YY - Year	1	0	99
3	D - Day of week	1	1	7
4	HH - Hour	1	0	23
5	MM - Minute	1	0	59
6	SS - Second	1	0	59

Note: Year: 00 = 2000
Day of Week begins at 1 = Sunday
Date and time value is in BCD format

0x0009

Set Slave Real Time Clock Request/Response Frame Descriptions

Type: System Message

Mode: Unicast or Broadcast

Request:

The Set Slave Real Time Clock request frame is transmitted by a poll master, UIST II, or evaluation software to set the RTC of the slave if applicable.

FUNCTION CODE = 9 (0x0009)
LENGTH = 15 (0x000F)

Request Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	MM - Month	1	1	12
1	DD - Day of Month	1	1	31
2	YY - Year	1	0	99
3	D - Day of week	1	1	7
4	HH - Hour	1	0	23
5	MM - Minute	1	0	59
6	SS - Second	1	0	59

Note: Year: 00 = 2000
Day of Week begins at 1 = Sunday
Date and time value is in BCD format

Response:

The Set Slave Real Time Clock response is transmitted by a poll slave in response to a previously issued Set Slave Real Time Clock request frame. It is up to the software that requested the set command to ensure that the value is correct in the response.

FUNCTION CODE = 0x0009
LENGTH = 8 (0x0008), (Real Time Clock Not Supported)
LENGTH = 15 (0x000F), (Real Time Clock Supported)

Response Payload:

Same as format as Request Payload

Device Specific Function Codes

Device specific polls:

Function Code	Description	Operation
0x0100	MicroPoint II, PM II	Alarm Poll
0x0200	Relay Output Module II-16, ROM II-16	Set/Clear Relay
0x0300	Relay Output Module II-8, ROM II-8	Set/Clear Relay
0x0400	Alarm Input Module II, AIM II	Alarm Poll
0x0500	MicroTrack II, MTP II	Alarm Poll
0x0600	Model 330	Alarm Poll

0x0100

MicroPoint II (PM II) Poll Request/Response Frame Description

Mode: Unicast

Request:

The MicroPoint II Alarm Poll request frame is transmitted by a poll master, UIST II, or evaluation software to retrieve cable alarms, aux inputs, tamper, cable fault, and service information of a MicroPoint II processor.

FUNCTION CODE = 256 (0x0100)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

The MicroPoint II Alarm Poll response frame shall transmit current alarm information of the device.

FUNCTION CODE = 256 (0x0100)
LENGTH = 67 (0x0043)

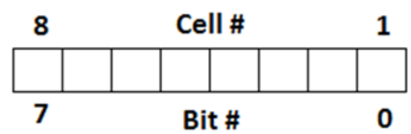
Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Cable A Alarms	27	0	0xFF
27	Cable B Alarms	27	0	0xFF
54	Aux. Inputs	1	0	0x0F
55	Tamper, Faults	1	0	0x0F
56	Service Status	1	0	0x01
57	Reserved	2	0	0xFFFF

Cable A Alarm Status:

Byte 0	Cells 8-1	Byte 9	Cells 80-73	Byte 18	Cells 152-145
Byte 1	Cells 16-9	Byte 10	Cells 88-81	Byte 19	Cells 160-153
Byte 2	Cells 24-17	Byte 11	Cells 96-89	Byte 20	Cells 168-161
Byte 3	Cells 32-25	Byte 12	Cells 104-97	Byte 21	Cells 176-169
Byte 4	Cells 40-33	Byte 13	Cells 112-105	Byte 22	Cells 184-177
Byte 5	Cells 48-41	Byte 14	Cells 120-113	Byte 23	Cells 192-185
Byte 6	Cells 56-49	Byte 15	Cells 128-121	Byte 24	Cells 200-193
Byte 7	Cells 64-57	Byte 16	Cells 136-129	Byte 25	Cells 208-201
Byte 8	Cells 72-65	Byte 17	Cells 144-137	Byte 26	Cells 216-209

Byte 0 example

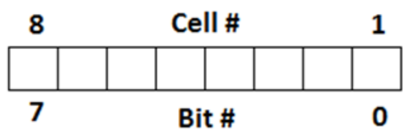


The lowest numbered subcell is in the least significant bit of each byte.
Where bit state: 1 = Alarm
0 = Normal

Cable B Alarm Status:

Byte 27	Cells 8-1	Byte 36	Cells 80-73	Byte 45	Cells 152-145
Byte 28	Cells 16-9	Byte 37	Cells 88-81	Byte 46	Cells 160-153
Byte 29	Cells 24-17	Byte 38	Cells 96-89	Byte 47	Cells 168-161
Byte 30	Cells 32-25	Byte 39	Cells 104-97	Byte 48	Cells 176-169
Byte 31	Cells 40-33	Byte 40	Cells 112-105	Byte 49	Cells 184-177
Byte 32	Cells 48-41	Byte 41	Cells 120-113	Byte 50	Cells 192-185
Byte 33	Cells 56-49	Byte 42	Cells 128-121	Byte 51	Cells 200-193
Byte 34	Cells 64-57	Byte 43	Cells 136-129	Byte 52	Cells 208-201
Byte 35	Cells 72-65	Byte 44	Cells 144-137	Byte 53	Cells 216-209

Byte 27 example



The lowest numbered subcell is in the least significant bit of each byte.
Where bit state: 1 = Alarm
0 = Normal

Auxiliary Inputs:

Byte 54 - bit 0 = Auxiliary Input 1
Byte 54 - bit 1 = Auxiliary Input 2
Byte 54 - bit 2 = Auxiliary Input 3
Byte 54 - bit 3 = Auxiliary Input 4
Byte 54 - bit 4 = Reserved
Byte 54 - bit 5 = Reserved
Byte 54 - bit 6 = Reserved
Byte 54 - bit 7 = Reserved

Where bit state: 1 = Alarm
0 = Normal

Tamper, Faults:

Byte 55 - bit 0 = Alarm status for Cable A Fault
Byte 55 - bit 1 = Alarm status for Cable B Fault
Byte 55 - bit 2 = Alarm status for Enclosure Tamper
Byte 55 - bit 3 = Alarm status for the Software Trap
Byte 55 - bit 4 = Reserved
Byte 55 - bit 5 = Reserved
Byte 55 - bit 6 = Reserved
Byte 55 - bit 7 = Reserved

Where bit state: 1 = Alarm
0 = Normal

Service Status:

Byte 56 – bit 0 = Universal Installation Service Tool II active (UIST II)
Byte 56– bits 1-7: reserved

Where bit state: 1 = UIST II Active
0 = Normal

Reserved: Factory Reserved Bytes, (2 Bytes)

0x0200

Relay Output Module II-16 (ROM II-16) Poll Request/Response Frame Description

Mode: Unicast

Request:

The ROM II-16, Set/Clear Relay request frame is issued by the poll master to control 1 of 16 relays. The normal, non-alarm state of a relay on a ROM II-16 is energized. A power loss places the relays in an alarm state. Transmitting a '1' to a relay places that relay in an alarm condition. Transmission of a '0' to a relay places it in a normal, energized, position. The data is organized as two bytes with each bit representing the desired state of the relay.

FUNCTION CODE = 512 (0x0200)
LENGTH = 10 (0x000A)

Request Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Set/Clear Relays [16..9]	1	0	0xFF
1	Set/Clear Relays [8..1]	1	0	0xFF

Set/Clear Relay:

Byte 0 - bit 7 = Relay Output 16
Byte 0 - bit 6 = Relay Output 15
Byte 0 - bit 5 = Relay Output 14
Byte 0 - bit 4 = Relay Output 13
Byte 0 - bit 3 = Relay Output 12
Byte 0 - bit 2 = Relay Output 11
Byte 0 - bit 1 = Relay Output 10
Byte 0 - bit 0 = Relay Output 9

Byte 1 - bit 7 = Relay Output 8
Byte 1 - bit 6 = Relay Output 7
Byte 1 - bit 5 = Relay Output 6
Byte 1 - bit 4 = Relay Output 5
Byte 1 - bit 3 = Relay Output 4
Byte 1 - bit 2 = Relay Output 3
Byte 1 - bit 1 = Relay Output 2
Byte 1 - bit 0 = Relay Output 1

Where bit state: 0 – Set relay to Normal Position
1 – Set relay to Alarm Position

Response:

The ROM II-16, Set/Clear Relay response frame is generated in receipt of a previously processed ROM II-16, Set/Clear Relay request. The values returned equate to the relay status once the request has been processed.

FUNCTION CODE = 512 (0x0200)
LENGTH = 13 (0x000D)

Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Relay Status[16..9]	1	0	0xFF
1	Relay Status [8..1]	1	0	0xFF
2	Tamper Status	1	0	0x01
3	Reserved	2	0	0xFFFF

Relay Status:

Byte 0 - bit 7 = Relay Output 16	Byte 1 - bit 7 = Relay Output 8
Byte 0 - bit 6 = Relay Output 15	Byte 1 - bit 6 = Relay Output 7
Byte 0 - bit 5 = Relay Output 14	Byte 1 - bit 5 = Relay Output 6
Byte 0 - bit 4 = Relay Output 13	Byte 1 - bit 4 = Relay Output 5
Byte 0 - bit 3 = Relay Output 12	Byte 1 - bit 3 = Relay Output 4
Byte 0 - bit 2 = Relay Output 11	Byte 1 - bit 2 = Relay Output 3
Byte 0 - bit 1 = Relay Output 10	Byte 1 - bit 1 = Relay Output 2
Byte 0 - bit 0 = Relay Output 9	Byte 1 - bit 0 = Relay Output 1

Where bit state: 0 – Normal Position, Relay is energized
1 – Alarm Position, Relay is de-energized

Tamper Status:

Byte 2: 0x00 – Normal Position
0x01 – In Tamper

Reserved: Factory Reserved Bytes, (2 Bytes)

0x0300

Relay Output Module II-8 (ROM II-8) Poll Request/Response Frame Description

Mode: Unicast

Request:

The ROM II-8 Set/Clear Relay request frame is issued by the poll master to control 1 of 8 relays. The normal, non-alarm state of a relay on a ROM II-8 is energized. A power loss places the relays in an alarm state. Transmitting a ‘1’ to a relay places that relay in an alarm condition. Transmission of a ‘0’ to a relay places it in a normal, energized, position. The data is organized as one byte with each bit representing the desired state of the relay.

FUNCTION CODE = 768 (0x0300)
LENGTH = 9 (0x0009)

Request Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Set/Clear Relays [8..1]	1	0	0xFF

Set/Clear Relay:

Byte 0 - bit 7 = Relay Output 8
Byte 0 - bit 6 = Relay Output 7
Byte 0 - bit 5 = Relay Output 6
Byte 0 - bit 4 = Relay Output 5
Byte 0 - bit 3 = Relay Output 4
Byte 0 - bit 2 = Relay Output 3
Byte 0 - bit 1 = Relay Output 2
Byte 0 - bit 0 = Relay Output 1

Where bit state: 0 – set relay to Normal Position
1 – set relay to Alarm Position

Response

The ROM II-8 Set/Clear Relay response frame is generated in receipt of a previously processed ROM II-8 Set/Clear Relay request. The values returned equate to the relay status once the request has been processed.

FUNCTION CODE = 768 (0x0300)
LENGTH = 12 (0x000C)

Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Relays Status[8..1]	1	0	0xFF
1	Tamper Status	1	0	0x01
2	Reserved	2	0	0xFFFF

Relay Status:

Byte 0 - bit 7 = Relay Output 8
Byte 0 - bit 6 = Relay Output 7
Byte 0 - bit 5 = Relay Output 6
Byte 0 - bit 4 = Relay Output 5
Byte 0 - bit 3 = Relay Output 4
Byte 0 - bit 2 = Relay Output 3
Byte 0 - bit 1 = Relay Output 2
Byte 0 - bit 0 = Relay Output 1

Where bit state: 0 – Normal Position, Relay is energized
1 – Alarm Position, Relay is de-energized

Tamper Status:

Byte 1: 0x00 – Normal Position
0x01 – In Tamper

Reserved: Factory Reserved Bytes, (2 Bytes)

0x0400

Alarm Input Module II (AIM II) Poll Request/Response Frame Description

Mode: Unicast

Request:

The AIM II, Get Alarm Input Status request frame is transmitted by the poll master to get the alarm state of the inputs. The line status for each input and the tamper state are also provided.

FUNCTION CODE = 1024 (0x0400)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

The AIM II, Get Alarm Input Status response frame contains the status of each Alarm Input as well as the Input Line Status. If the input is configured to be supervised and the line is in fault, a Line Status Alarm will be set for that input. If the input is not configured to be supervised, then the Line Status Alarm will always return value of 0. The tamper switch state is also provided.

FUNCTION CODE = 1024 (0x0400)
LENGTH = 13 (0x000D)

Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Alarm Input	1	0	0xFF
1	Line Status	1	0	0xFF
2	Tamper Switch	1	0	0x01
3	Reserved	2	0	0xFFFF

Alarm Input Byte:

Byte 0 - bit 7 = Alarm Input 8
Byte 0 - bit 6 = Alarm Input 7
Byte 0 - bit 5 = Alarm Input 6
Byte 0 - bit 4 = Alarm Input 5
Byte 0 - bit 3 = Alarm Input 4
Byte 0 - bit 2 = Alarm Input 3
Byte 0 - bit 1 = Alarm Input 2
Byte 0 - bit 0 = Alarm Input 1

Where bit state: 1 = Alarm
0 = Normal

Line Status Byte:

Byte 1 - bit 7 = Supervised Alarm on Input 8
Byte 1 - bit 6 = Supervised Alarm on Input 7

Byte 1 - bit 5 = Supervised Alarm on Input 6
Byte 1 - bit 4 = Supervised Alarm on Input 5
Byte 1 - bit 3 = Supervised Alarm on Input 4
Byte 1 - bit 2 = Supervised Alarm on Input 3
Byte 1 - bit 1 = Supervised Alarm on Input 2
Byte 1 - bit 0 = Supervised Alarm on Input 1

Where bit state: 1 = Alarm
0 = Normal

Tamper Status:

Byte 2: 0x00 – Normal Position
0x01 – In Tamper

Reserved: Factory Reserved Bytes, (2 Bytes)

0x0500

MicroTrack II (MTP II) Poll Request/Response Frame Description

Mode: Unicast

Request:

The MicroTrack II Alarm Poll request frame is transmitted by a poll master, UIST II, or evaluation software to retrieve alarm, tamper, fault, and service information of a MicroTrack II processor.

FUNCTION CODE = 1280 (0x0500)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

The MicroTrack II Alarm Poll response frame shall transmit current alarm information of the device.

FUNCTION CODE = 1280 (0x0500)
LENGTH = 48 (0x0030)

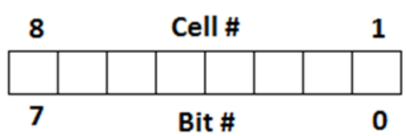
Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Cable A Alarms	18	0	0xFF
18	Cable B Alarms	18	0	0xFF
36	Tamper, Faults	1	0	0x0F
37	Service Status	1	0	0x01
38	Reserved	2	0	0xFFFF

Cable A Alarms:

Byte 0	Cells 8-1	Byte 9	Cells 80-73
Byte 1	Cells 16-9	Byte 10	Cells 88-81
Byte 2	Cells 24-17	Byte 11	Cells 96-89
Byte 3	Cells 32-25	Byte 12	Cells 104-97
Byte 4	Cells 40-33	Byte 13	Cells 112-105
Byte 5	Cells 48-41	Byte 14	Cells 120-113
Byte 6	Cells 56-49	Byte 15	Cells 128-121
Byte 7	Cells 64-57	Byte 16	Cells 136-129
Byte 8	Cells 72-65	Byte 17	Cells 144-137

Byte 0 example

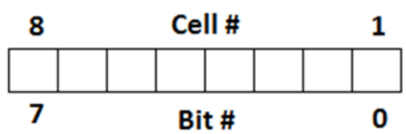


The lowest numbered subcell is in the least significant bit of each byte.
Where bit state: 1 = Alarm
0 = Normal

Cable B Alarms:

Byte 18	Cells 8-1	Byte 27	Cells 80-73
Byte 19	Cells 16-9	Byte 28	Cells 88-81
Byte 20	Cells 24-17	Byte 29	Cells 96-89
Byte 21	Cells 32-25	Byte 30	Cells 104-97
Byte 22	Cells 40-33	Byte 31	Cells 112-105
Byte 23	Cells 48-41	Byte 32	Cells 120-113
Byte 24	Cells 56-49	Byte 33	Cells 128-121
Byte 25	Cells 64-57	Byte 34	Cells 136-129
Byte 26	Cells 72-65	Byte 35	Cells 144-137

Byte 18 example



The lowest numbered subcell is in the least significant bit of each byte.
Where bit state: 1 = Alarm
0 = Normal

Tamper, Faults:

Byte 36 - bit 0 = Alarm status for Cable A Fault
Byte 36 - bit 1 = Alarm status for Cable B Fault
Byte 36 - bit 2 = Alarm status for Enclosure Tamper
Byte 36 - bit 3 = Alarm status for the Software Trap
Byte 36 - bit 4 = Reserved
Byte 36 - bit 5 = Reserved
Byte 36 - bit 6 = Reserved
Byte 36 - bit 7 = Reserved

Where bit state: 1 = Alarm
0 = Normal

Service Status:

Byte 37 – bit 0 = Universal Installation Service Tool II active (UIST II)
Byte 37 – bits 1-7 = reserved

Where bit state: 1 = UIST II connected
0 = Normal

Reserved: Factory Reserved Bytes, (2 Bytes)

0x0600

Model 330 Poll Request/Response Frame Description

Type: Model 330 (Microwave Link)

Mode: Unicast

Request:

The Model 330 Alarm Poll request frame is transmitted by a poll master, UIST II, or evaluation software to retrieve alarm, tamper, fault, and service information of a Model 330.

FUNCTION CODE = 6 (0x0600)
LENGTH = 8 (0x0008)

Request Payload: None

Response:

The Model 330 Alarm Poll response frame shall transmit current alarm information of the device.

FUNCTION CODE = 1536 (0x0600)
LENGTH = 11 (0x000B)

Response Payload:

Byte Offset	Description	Byte Count	Min.	Max.
0	Alarms	1	0	0x1F
1	Reserved	2	0	0xFFFF

Alarms:

Byte 0, bit 0 = Sensor alarm
Byte 0, bit 1 = Tamper alarm
Byte 0, bit 2 = Path alarm
Byte 0, bit 3 = Auxiliary alarm
Byte 0, bit 4 = Service alarm

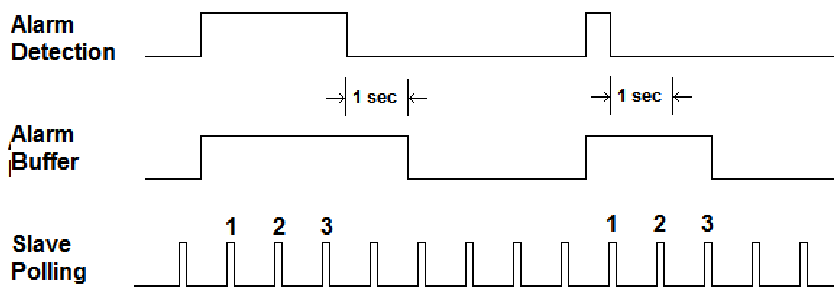
Where bit state: 1 = Alarm
0 = Normal

Reserved: Factory Reserved Bytes, (2 Bytes)

Operation of the Alarm Buffers

When any alarm occurs on an INTREPID sensor, the corresponding bit in the alarm buffer will be set and will remain set for as long as the alarm is present, plus the sensors Alarm Hold Time, and until the devices alarm buffer has been polled at least 3 times by the poll master, whichever is longer.

For example (assuming the Alarm Hold Time is set to 1 second), if an alarm occurs that lasts 3 seconds, the bit in the alarm buffer will remain high for at least 4 seconds. It will not clear until the poll master has polled it at least 3 times. This is done to prevent the poll master from missing any alarms.



The Alarm Hold Time is a function of the individual sensors and devices. See the devices manuals for further details on this and other controls that are available which affect the alarm buffer.

Communications Port Settings

The IPP II polling protocol is designed to operate using the RS422 standard with the following settings:

Baud Rate	57,600
Data Bits	8
Parity	none
Stop Bits	1
Bit order	LSB first, MSB last