Icron_Colour

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# Overview

Icron Technologies' "SwitchableUSB™: Device Configuration Network Protocol" provides the ability to discover and configure Icron ExtremeUSB® extenders on a local ethernet network. The protocol works on top of UDP, so it should be possible to write a configuration client for almost any platform. The Icron devices will listen on UDP port 6137 for incoming messages and replies will be sent back to the port that the request originated from. All IP packets sent from the client to the devices are broadcast packets. The device knows which packets to process based on the Device MAC Address field in each packet. The devices will reply to messages using broadcast IP packets as well. The source IP of messages originating from the Icron devices will always be 0.0.0.0.



Figure 1Icron USB extenders on a local network

# General Information

All packets contain the following:

|  |  |
| --- | --- |
| Magic Number | A value (0xA9C4D8F4) which gives some confidence that the data which follows is an ICRON configuration message. |
| Message ID | When the client sends a request, it chooses any value to insert in this field. The device responding to the request will set this field in the reply to the same value it received in the request. |
| Command | An integer from 0-255. This is the identifier of the command. |
| Device MAC Address | The 6-byte MAC address of the device involved in the message. This field is populated with the device’s MAC regardless of whether the message is from the client to the device or a reply from the device to the client. |

* All multi-byte fields are packed as big endian.
* Messages are at least 16 bytes and at most 142 bytes in length.
* Any string fields should be encoded using UTF-8.

# Supported Messages

## Request Device Information

This message is sent from the client to a device in order to solicit a Reply Device Information message. This message can be sent with Device MAC Address set to FF:FF:FF:FF:FF:FF in order to discover all of the Icron USB extender devices on the local network.

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 0 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | |

+-----------------------------------------+

## Reply Device Information

This message is sent from a device to a client in response to a Request Device Information message. This message is also broadcast from a device on startup.

### Field Descriptions

|  |  |
| --- | --- |
| Vendor | A 32 byte NUL terminated string containing the device's vendor name. |
| Product | A 32 byte NUL terminated string containing the device's product name. |
| Revision | A 12 byte NUL terminated string containing the device's revision number. |
| LEX/REX | 0=Device is a LEX, 1=Device is a REX |
| Supported Protocol Version | Version of the protocol supported by this device. Clients may read this value to determine which commands this device is capable of handling based on an understanding of which commands are supported by a specific protocol version. |
| Paired With MAC Address | MAC address of a device that this device is paired with. This field is optional and may be repeated multiple times to facilitate pairing with multiple devices. |

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 1 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | | Vendor |

+-----------------------------------------+ +

16 | |

+ +

. . .

. . .

. . .

+ +-----------------------------------------+

46 | | Product |

+-----------------------------------------+ +

48 | |

+ +

. . .

. . .

. . .

+ +-----------------------------------------+

78 | | Revision |

+-----------------------------------------+ +

80 | |

+ +

. . .

. . .

. . .

+ +-----------------------------------------+

90 | | LEX/REX |

+-----------------------------------------+-----------------------------------------+

92 | Supported Protocol Version = 1 | Paired With MAC Address |

+--> +-----------------------------------------+ +

| 94 | |

| + +

| 96 | |

| + +-----------------------------------------+

| 98 | |

+--> +-----------------------------------------+

|

+--- Repeated 0 or 1 times for a LEX and 0 to the number of REX supported (currently 1) for REX

## Ping

This message is sent from a client to a device. It is used to check if a device is active. An Acknowledge message will be sent by the device in response.

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 2 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | |

+-----------------------------------------+

## Acknowledge

This message is a generic ACK message that will be sent in response to all requests made by clients that do not require returning an additional data payload in the response. The Message ID field should be sufficient to determine which message is being ACKed.

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 3 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | |

+-----------------------------------------+

## Pair To Device

Sent by a client to a device to instruct a device to try to pair with a different device specified in this message. A client must send this message to a LEX and a REX to instruct them to pair together, but the order of the two messages does not matter. The device will respond with an Acknowledge message if it is able to pair with a new device or a Negative Acknowledge message otherwise. The transmission of the Acknowledge message only indicates that an attempt will be made to establish a link between the devices, not that a link is already established.

### Field Descriptions

|  |  |
| --- | --- |
| Pair To Device MAC Address | The MAC address that the client is telling the device to attempt to pair with. |

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 4 | Device MAC Address |

+-----------------------------------------+ +

10 | Device MAC Address |

+ +

12 | |

+ +-----------------------------------------+

14 | | Pair To Device MAC Address |

+-----------------------------------------+ +

16 | |

+ +

18 | |

+ +-----------------------------------------+

20 | |

+-----------------------------------------+

## Remove Device Pairing

Sent by a client to a device to instruct a device to discard any existing pairing it has. This will effectively disconnect any USB devices that were downstream of the remote extender. The client must send a Remove Device Pairing message to each of the devices in the pairing. The device will send an Acknowledge message in response to a Remove Device Pairing message or a Negative Acknowledge if the device is already unpaired or paired to a different device than the one specified.

### Field Descriptions

|  |  |
| --- | --- |
| Paired MAC Address | The MAC address that the client is telling the device to disassociate from. |

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 5 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | | Paired MAC Address |

+-----------------------------------------+ +

16 | |

+ +

18 | |

+ +-----------------------------------------+

20 | |

+-----------------------------------------+

## Request Device Topology

Sent by a client to a LEX device in order to obtain the set of USB devices in the system. A REX device will send a Negative Acknowledge message in response to this message.

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 6 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | |

+-----------------------------------------+

## Reply Device Topology

Sent by a LEX device in response to a Request Device Topology message. This message is of variable length depending on the number of devices that are in the system. The combination of the information is enough for a client to build and display a device tree.

### Field Descriptions

|  |  |
| --- | --- |
| USB Address | An integer from 0 to 127. |
| USB Address Of Parent | An integer from 1 to 127. If a USB Address is seen which is not listed as the USB Address Of Parent for any of the devices, then that device is the root of the device topology. |
| Port On Parent | An integer from 1 to 127. 0 is not a valid number for a port on a hub, so this field will only be 0 if there is no USB device upstream before the host. |
| Is Device A Hub | 0=FALSE, 1=TRUE |
| USB Vendor Id | The USB vendor id from the device descriptor. |
| USB Product Id | The USB product id from the device descriptor. |

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 7 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+------ + --- ... ... --> +-----------------------------------------+

| 14 | | USB Address |

| +-----------------------------------------+-----------------------------------------+

| 16 | USB Address Of Parent | Port On Parent |

| +-----------------------------------------+-----------------------------------------+

| 18 | Is Device A Hub | USB Vendor Id |

| +-----------------------------------------+-----------------------------------------+

| 20 | ... USB Vendor Id (cont) | USB Product Id |

| +-----------------------------------------+-----------------------------------------+

| 22 | ... USB Vendor Id (cont) |

+--> +-----------------------------------------+

|

+--- Last 6 fields repeated 0 to MAX\_USB\_DEVICES(=32) times

## Reply Unhandled Command

Sent by a device to a client to indicate that a message was received by the device, but the message with that command number is not supported by the device.

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 8 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | |

+-----------------------------------------+

## Negative Acknowledge

This message is a generic NAK message that may be sent in response to a Pair To Device, Remove Device Pairing or Request Device Topology message. It indicates to the client that their request was received, but that no action will be taken as a result of that message. The Message ID field should be sufficient to determine which message is being NAKed.

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 9 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | |

+-----------------------------------------+

## Remove All Pairings

Sent by a client to a device to instruct a device to clear all of its pairings. This message may be sent to a device that currently has no pairings, but will have no effect.

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 10 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | |

+-----------------------------------------+

## Use Filtering Strategy

Sent by a client to a device to tell a device that it should use a certain type of filtering strategy contained within this message. The filtering strategy denotes which type of devices will be filtered out by the extenders. An acknowledgement message will be sent back to the client if the extender supports device class filtering, and a valid strategy was selected. Otherwise, a NAK will be sent to the client.

### Field Descriptions

|  |  |
| --- | --- |
| Filtering Strategy | 0: Allow all devices  1: Block all devices except HID and hub  2: Block mass storage devices  3: Block all devices except HID, hub, and smartcard |

Byte Offset

+-----------------------------------------+-----------------------------------------+

0 | Magic Number |

+ +

2 | |

+-----------------------------------------+-----------------------------------------+

4 | Message ID |

+ +

6 | |

+-----------------------------------------+-----------------------------------------+

8 | Command = 11 | Device MAC Address |

+-----------------------------------------+ +

10 | |

+ +

12 | |

+ +-----------------------------------------+

14 | | Filtering Strategy |

+-----------------------------------------+-----------------------------------------+