



Please login to begin...

Username

Password

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APPLICATION NOTE

System Manager 2
Third Party Interface
RESTful IP Communication

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System Manager 2 Third Party Interface RESTful IP Communication

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Third Party Interface

While the SmartServer based System Manager 2 came with a third party interface (TPI) based on Sockets and TCP/IP , the Protocessor based version of System Manager 2 comes with a RESTful interface to allow more sophisticated access to the system.

TCP/IP

In order to connect to System Manager 2 and the Protocessor for purposes of third party control via TCP/IP, you must establish a connection to the REST endpoint using a TCP/IP client to the IP address of the Protocessor using port 80. Once connected, you can control the Lencore hardware using the protocol that is listed later in the document.

TPI Protocol

The TPI supports a wide range of control and queries, where one can control an i.Net® OP directly. It should be noted, that the TPI will NOT return a response, with data, when sending Zone control, as the messages for Zone control are one way. However with direct control of the OP, you will receive responses, with data, from query message requests. However, you will always get confirmation REST responses for all commands.

When sending direct OP messages, you should wait for a reply until you send the next message. With Zone control messages, since you won't get a response, you should wait 500ms between messages. This document will not list all commands available, only the common commands that a TPI control system may use.

Protocol Definition

- All protocol values are listed in actual decimal values and should not be mistaken for ASCII encoded values.
- An OP message is a collection of parameters where each parameter is represented as a byte.
- The message is composed of 6 parameter bytes and up to 25 data bytes.
- See pages 7 and 17 for examples of message string sequences.
- In this document, all parameters are shown as decimal numbers not hexadecimal numbers.

RESTful communication:

A typical REST call looks like the following:

```
// typical rest JSON request fields
parameters (object)

// example
{
    "parameters": {}
}
```

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A typical RESTful response would look like this:

```
// typical rest JSON response payload fields
message (string)
data (object)
error (string)

// response
{
    "message": "",
    "data": {},
    "error": ""
}
```

Before any meaningful control can be done with the TPI interface, you must first login to the Protocessor and get a “token”, as follows:

Resource endpoint//
http://ip.address/rest/login

```
// login parameters
username
password

// example (“HTTP GET” Request)
http://ip.address/rest/login?username=somename&password=somepassword

// example normal login response payload
{
    "message": "Logged in ok",
    "data": {
        "token": "eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ"
    },
    "error": null
}
```

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Now that we have a basic connection established, we can start to do control of various functions. A typical api call for control the volume of Masking Attenuation would look like this:

Payload Examples:

Example Payload of a request to a single OP:

```
// "OP" example request payload (MASK_ATTENUATION (get all channel values)) /////////////////////////////////
{
    "parameters": { "OPAddress": 1, "OPGroupSelect": 0, "OPCommandCat": 1, "OPSubCommand": 10, "OPTransactionID": 0, "OPDataCount": 6, "OPData":[] }

}

// "OP" example response payload (MASK_ATTENUATION (get all channel values))
{
    "message": "Call successful",
    "data": {
        "OPAddress": 1,
        "OPResultCode": 1,
        "OPCommandCat": 1,
        "OPSubCommand": 10,
        "OPTransactionID": 110,
        "OPDataCount": 12,
        "OPData": [
            49,
            50,
            49,
            49,
            0,
            0
        ]
    },
    "error": null
}
```

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Example payload of a change to all OP's:

```
// GLOBAL example payload (set MASK_ATTENUATION (ch1))
///////////////////////////////
{
    "parameters": { "OPAddress": 0, "OPGroupSelect": 127, "OPCommandCat": 1, "OPSubCommand": 1, "OPTransactionID": 88, "OPDataCount": 7, "OPData": [49] }
}

// example GLOBAL response payload example (set MASK_ATTENUATION (ch1))
{
    "message": "Call successful",
    "data": "Success",
    "error": null
}
```

Example of a change to a group of Ops by using Zone:

```
// "MASK ZONE 1" example response payload example (set MASK_ATTENUATION (ch1))
///////////////////////////////
{
    "parameters": { "OPAddress": 1, "OPGroupSelect": 1, "OPCommandCat": 1, "OPSubCommand": 1, "OPTransactionID": 88, "OPDataCount": 7, "OPData": [49] }
}

// "MASK ZONE 1" example response payload example (set MASK_ATTENUATION (ch1))
{
    "message": "Call successful",
    "data": "Success",
    "error": null
}
```

Complete example

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The specific API call is implemented as below. Refer to the command listings at the end of this document for all the parameters.

```
// Control Resource endpoint
```

```
http://ip.address/rest/method/TPI/control
```

```
// control parameters
```

```
happn_token // Auth Token parameter- This is the Token from above login process
```

```
// control "parameters" JSON request payload
```

```
OPAddress (unsigned byte)
```

```
OPGroupSelect (unsigned byte)
```

```
OPCommandCat (unsigned byte)
```

```
OPSubCommand (unsigned byte)
```

```
OPTransactionID (unsigned byte) (Transaction ID is ignored)
```

```
OPDataCount (unsigned byte)
```

```
OPData (unsigned byte array)
```

```
// control "data" JSON response payload
```

```
OPAddress (unsigned byte)
```

```
OPResultCode (unsigned byte)
```

```
OPCommandCat (unsigned byte)
```

```
OPSubCommand (unsigned byte)
```

```
OPTransactionID (unsigned byte) (Transaction ID is actual used)
```

```
OPDataCount (unsigned byte)
```

```
OPData (unsigned byte array)
```

```
// example ("HTTP POST" Request)
```

```
http://ip.address/rest/method/TPI/control?happn_token=eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ
```

```
// "OP" example payload (set MASK_ATTENUATION (ch1))
```

```
//////////////////////////////
```

```
{
```

```
    "parameters": { "OPAddress": 1, "OPGroupSelect": 0, "OPCommandCat": 1,
```

```
    "OPSubCommand": 1, "OPTransactionID": 0, "OPDataCount": 7, "OPData": [49] }
```

```
}
```

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```
// "OP" example response payload example (set MASK_ATTENUATION (ch1))
{
    "message": "Call successful",
    "data": {
        "OPAddress": 1,
        "OPResultCode": 1,
        "OPCommandCat": 1,
        "OPSubCommand": 1,
        "OPTransactionID": 19,
        "OPDataCount": 7,
        "OPData": [
            49
        ],
    },
    "error": null
}

"data": "Success",
"error": null
}
```

In all the above examples, all the parameters come from the list of commands below. Find the command that you want to do and use those values in the commands above.

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i.NET® OP Communication Messages

OP_Request Header.

Request header

Byte 1 = OP Address = Group number = Global	= 1 to 199 if parameter 2 is INDIVIDUAL. = 1 to 255 if parameter 2 is MASK_GROUP, PAGE_GROUP or MUSIC_GROUP. = 0 if parameter 2 is GLOBAL_SELECT.
Byte 2 = Group Select = 0 = 1 = 10 = 20 = 127	INDIVIDUAL MASK_GROUP PAGE_GROUP MUSIC_GROUP GLOBAL_SELECT
Byte 3 = Command Category = 1 = 10 = 20	MASK_ATTENUATION PAGE_ATTENUATION MUSIC_ATTENUATION
Byte 4 = Sub Command (dependent on command category) = 1 = 2 = 3 = 4 = 5 = 6 = 7 = 8 = 9 = 10 = 11 to 21	Set value for channel A Set value for channel B Set value for channel C Set value for channel D Set value for all four channels Request current value for channel A Request current value for channel B Request current value for channel C Request current value for channel D Request current value for all four channels Dependent on command category
Byte 5 = Transaction ID Byte 6 = Parameter count Bytes 7 to 31	= 1 to 255 = 6 + any data bytes = 25 available data bytes

OP_Response Header.

Response header

Byte 1 = OP Address = Group number = Global	= 1 to 199 or ... = 1 to 255 or ... = 0
Byte 2 = Result Code = 1 = 2 = 3	COMMAND_SUCCESS COMMAND_FAIL NO_RESPONSE_FROM_DSP
Byte 3 = Command Category = 1 = 10 = 20	MASK_ATTENUATION PAGE_ATTENUATION MUSIC_ATTENUATION
Byte 4 = Sub Command Byte 5 = Transaction ID Byte 6 = Byte count Bytes 7 to 31	= 1 to 21 Dependent on command category = 1 to 255 = 6 to 31 = Return data bytes if any

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List of commands expressed as TPI numerical values.

Note: Assume OP-1, all sample values set to **DEFAULT**, and Transaction ID set to 88.

The Transaction ID can be any parameter value 1 to 255, 0 can be used but not recommended. Refer to the System Manager (dB) to TPI comparison chart at the end of this document.

MASK ATTENUATION TPI values = 0 to 97 (see dB to TPI comparison chart at the end of this document)

MuteTPI values = 1 to mute, 0 to unmute

Note: * When **MASK_GROUP** option is used in the header, only the "chall" sub command can be used.
! The Req.'s (request for current values), can only use **INDIVIDUAL** or **GLOBAL SELECT**.

PAGE ATTENUATION TPI values = 0 to 49 (see dB to TPI comparison chart at the end of this document)

Mute TPIpp values = 1 to mute, 0 to unmute

Note: * When **PAGE_GROUP** option is used in the header, only the "chall" sub command can be used.
! The Req.'s (request for current values), can only use **INDIVIDUAL** or **GLOBAL SELECT**.

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MUSIC ATTENUATION *TPI values* = 0 to 49 (see dB to TPI comparison chart at the end of this document)

MuteVBApp *values* = 1 to mute, 0 to unmute

Note: * When **MUSIC_GROUP** option is used in the header, only the "chall" sub command can be used.
! The Req.'s (request for current values), can only use **INDIVIDUAL** or **GLOBAL SELECT**.

i.NET Examples

Note: Unused data bytes should not be sent. For example, if the byte count is 7, only 7 bytes should be sent. Trailing zeros should not be sent.

Example response from **example 1** above.

Example response from **example 2** above.

Example response from **example 3** above.

Example response from **example 4** above.

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List of required "Response" parameter count

MASK_ATTENUATION

SubCommand 1 to 9, Required byte count = 1 + header = 7
SubCommand 10, Required byte count = 6 + header = 12
See below for byte 11, 12 decoding.

PAGE_ATTENUATION

SubCommand 1 to 9, Required byte count = 1 + header = 7
SubCommand 10, Required byte count = 6 + header = 12
See below for byte 11, 12 decoding.

MUSIC_ATTENUATION

SubCommand 1 to 9, Required byte count = 1 + header = 7
SubCommand 10, Required byte count = 6 + header = 12
See below for byte 11, 12 decoding.

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Superflag byte 11 (MSB) and 12 (LSB) decoding:

From returned bytes in ReqchallMASK_ATTENUATION sub command 10
Or

From returned bytes in ReqchallPAGE_ATTENUATION sub command 10
Or

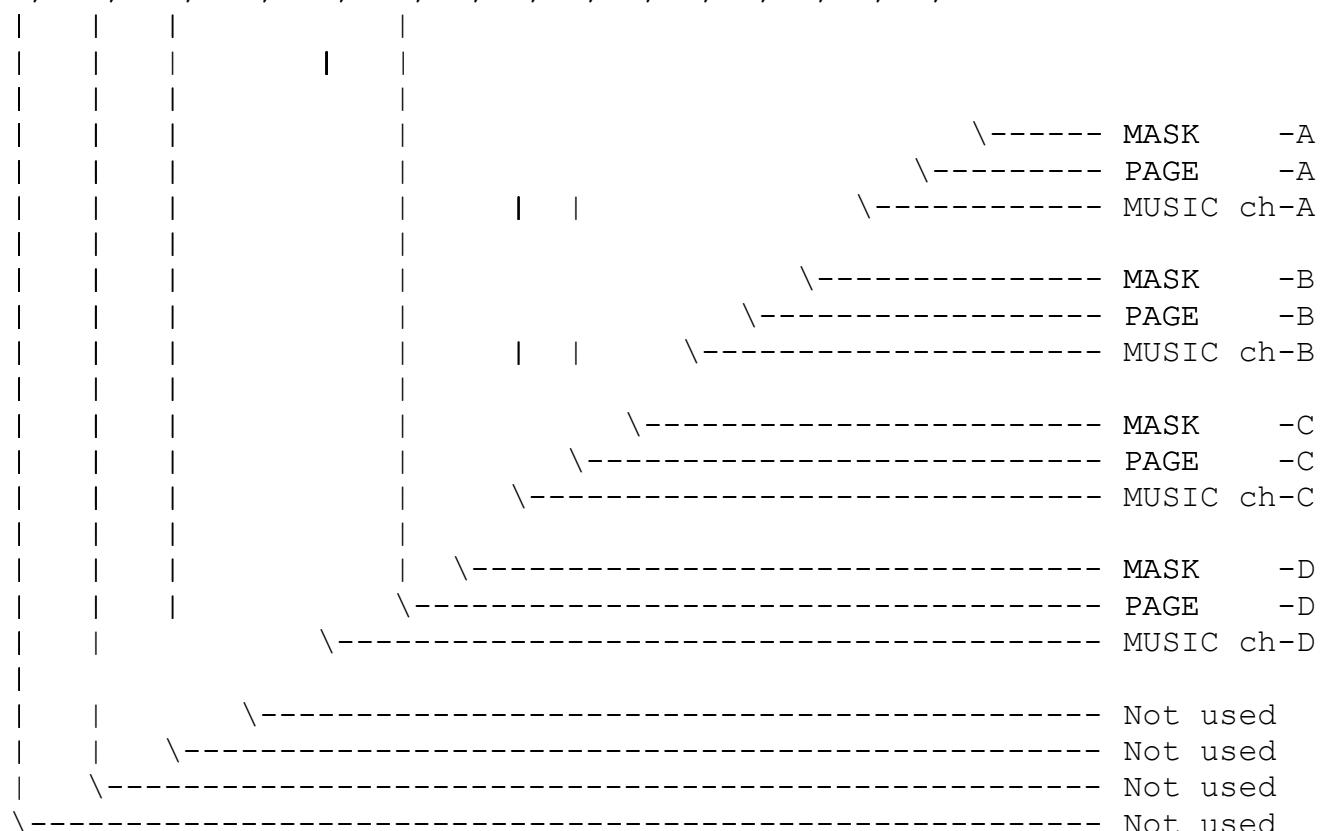
From returned bytes in ReqchallMUSIC_ATTENUATION sub command 10

A 0 in bit position means the channel is unmuted. (Default)

A 1 in bit position means the channel is muted.

Bit position:

15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0



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System Manager (dB) to TPI Comparison Chart

<u>System Manager (dB) Value to TPI Value Comparison</u>	
Mask Attenuation:	
<u>System Manager (dB) Value</u>	<u>TPI Value</u>
82.5	97
82	96
81.5	95
81	94
80.5	93
80	92
79.5	91
79	90
78.5	89
78	88
77.5	87
77	86
76.5	85
76	84
75.5	83
75	82
74.5	81
74	80
73.5	79
73	78
72.5	77
72	76
71.5	75
71	74
70.5	73
70	72
69.5	71
69	70
68.5	69
68	68
67.5	67
67	66
66.5	65
66	64
65.5	63
65	62

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64.5	61
64	60
63.5	59
63	58
62.5	57
62	56
61.5	55
61	54
60.5	53
60	52
59.5	51
59	50
	49
58.5	(Default)
58	48
57.5	47
57	46
56.5	45
56	44
55.5	43
55	42
54.5	41
54	40
53.5	39
53	38
52.5	37
52	36
51.5	35
51	34
50.5	33
50	32
49.5	31
49	30
48.5	29
48	28
47.5	27
47	26
46.5	25
46	24
45.5	23
45	22
44.5	21
44	20

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43.5	19
43	18
42.5	17
42	16
41.5	15
41	14
40.5	13
40	12
39.5	11
39	10
38.5	9
38	8
37.5	7
37	6
36.5	5
36	4
35.5	3
35	2
34.5	1
34	0 (off)

Page / Music Attenuation:	
<u>dB Value</u>	<u>TPI Value</u>
82.5	49
81.5	48
80.5	47
79.5	46
78.5	45
77.5	44
	43
76.5	(Default)
75.5	42
74.5	41
73.5	40
72.5	39
71.5	38
70.5	37
69.5	36
68.5	35
67.5	34
66.5	33

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65.5	32
64.5	31
63.5	30
62.5	29
61.5	28
60.5	27
59.5	26
58.5	25
57.5	24
56.5	23
55.5	22
54.5	21
53.5	20
52.5	19
51.5	18
50.5	17
49.5	16
48.5	15
47.5	14
46.5	13
45.5	12
44.5	11
43.5	10
42.5	9
41.5	8
40.5	7
39.5	6
38.5	5
37.5	4
36.5	3
35.5	2
34.5	1
34	0 (off)

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