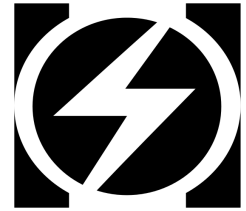

OSHMI



Open Substation HMI

DNP3 Driver

Configuration Manual

Version 0.6

© 2014-2018 Ricardo L. Olsen

Introduction

This driver is based on automatak opendnp3 protocol stack from:

<http://dnp3.github.io/>

Using this driver it is possible to connect OSHMI to “n” relays, RTU’s or other generic IED’s with the DNP3 / TCP protocol.

This driver is not a gateway, it only directs data to OSHMI.

Configuration

OSHMI must be configured to use the I104M adapter protocol. So, it must be configured the BDTR section of the *hmi.ini* file to disable the BDTR protocol, like this:

```
[BDTR]
IP_BDTR1=""
IP_BDTR2=""
```

Other entries in this section can be commented out.

The driver exe file must be copied to c:\oshmi\bin\.

The driver config file is c:\oshmi\conf\dnp3.ini. This file has the following format:

```
[MASTER]
LINK_ADDRESS=1
[SLAVE1]
IP_ADDRESS=127.0.0.1
IP_PORT=20000
LINK_ADDRESS=10
ENABLE_UN SOLICITED=1
INTEGRITY_SCAN=180
CLASS0_SCAN=8
CLASS1_SCAN=5
CLASS2_SCAN=17
CLASS3_SCAN=29
RESPONSE_TIMEOUT=2
TIME_SYNC=1
NODATA_TIMEOUT=30
RANGE_SCAN_1=1,0,0,0,10
[SLAVE2]
IP_ADDRESS=192.168.1.1
LINK_ADDRESS=20
...
```

Warning: do not let empty lines, this can cause problems.

To the master, just configure a link address.

For the slave must be configured IP and link address, the other parameters are optional.

The scan and timeout parameters are set in seconds.

TIME_SYNC=1 enables the time synchronization procedure.

NODATA_TIMEOUT defines the number of seconds with no data on link that will set the Link Comms Status Point. The value should be greater than the double of the smallest scan period defined. The value 0 (zero) disables this function.

INTEGRITY_SCAN defines a scan for objects of all classes. The value is period in seconds. The value 0 (zero) disables this scan.

CLASS0_SCAN, CLASS1_SCAN, CLASS2_SCAN and CLASS3_SCAN define a scans for objects of each class. The value is period in seconds. The value 0 (zero) disables the scan.

RANGE_SCAN_1, RANGE_SCAN_2, RANGE_SCAN_3, RANGE_SCAN_4 define ranges of points scans. There are 5 parameters for each range scan comma separated: group, variation, start, stop and period. Use 0 as period to demand a range scan only by command (see table).

In the *point_list.txt* file must be configured point addresses and conversion factors (*kconv's*) as needed.

DNP3 group types corresponds to different offset addresses in the addressing scheme for *point_list.txt* file to help identify the group of each point as the range of addresses in DNP3 repeats for each group (0 to "n"). It must be configured for each point the column ADDRESS of the *point_list.txt* file, put there the DNP3 address of the object plus the offset for the respective object group.

The digital point with address 999 represents the communication status for it's data link.

Object Group or Point	Group	Offset Addr
<i>Link Comms Status Point</i>		999
Binary Inputs	1/2	1000
Double Binary Inputs	3/4	50000
Analog Inputs	30/32	60000
Binary Counters	20	80000
Frozen Counters	21	85000
Binary Outputs - Commands	12	90000
<i>Demand Range Scan 4 Command</i>		93995
<i>Demand Range Scan 3 Command</i>		93996
<i>Demand Range Scan 2 Command</i>		93997
<i>Demand Range Scan 1 Command</i>		93998
<i>Demand Integrity Scan Command</i>		93999
Analog Outputs - Commands	41	94000
Digital Outputs Status		95000
Analog Outputs Status		99000

Each DNP3 slave is distinguished by the link address that must be entered in the RTU field from *point_list.txt* for each point.

E.g.: a binary input of address 17 of a DNP3 device with link address 5, in the *point_list.txt* file must be configured the column ADDRESS with the value 1017 (17+1000) and the column RTU with the value 5.

For commands, additionally must used the fields ASDU and KCONV1/2 as indicated below.

ASDU field must be configured according to the command type:

<i>DNP3 Command type</i>	<i>ASDU</i>
Binary command	45
Analog output, signed integer 16 bits	49
Analog output, float single precision	50
Analog output, signed integer 32 bits	51

KCONV1 must be programmed according to operation type, with or without select-before-operate:

<i>Select type for commands</i>	<i>KCONV1</i>
Command with <i>select and operate</i>	1
Command with no select , <i>direct operate</i>	0

KCONV2 for binary commands must be configured according to the type of operation desired:

<i>Operation type for commands</i>	<i>KCONV2</i>
<i>latch on or off</i>	0
<i>pulse trip or close</i>	65
<i>pulse (reset)</i>	1

Sample *point_list.txt* file configuration:

```

VERSION 3
POINT_NUMB ADDR      ID          TYP MESSAGE      ALM  EQ  INF  OR  UN  RTU  ASDU  KCONV1  KCONV2  SUPCMD  DC  PR  INIVAL "SUBST~BAY~DESCRIPTION"
999  999  DNP_DIGSIMP_10_COMMST  D OFF/ON      8  73  0  0  E  10  0  1.000000  -1.000000  0  1  1  0.00 "DNP10~Binary~Comm Status"
1000 1000 DNP_DIGSIMP_10_0      D OFF/ON      8  73  0  0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 0"
1001 1001 DNP_DIGSIMP_10_1      D OFF/ON      8  53  5  0  E  10  0  1.000000  0.000000  0  1  2  1.00 "DNP10~Binary~Input 1"
1002 1002 DNP_DIGSIMP_10_2      D OFF/ON      8  53  1  0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 2"
1003 1003 DNP_DIGSIMP_10_3      D OFF/ON      8  42  31 0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 3"
1004 1004 DNP_DIGSIMP_10_4      D OFF/ON      8  43  31 0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 4"
1005 1005 DNP_DIGSIMP_10_5      D OFF/ON      8  75  14 0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 5"
1006 1006 DNP_DIGSIMP_10_6      D OFF/ON      8  48  14 0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 6"
1007 1007 DNP_DIGSIMP_10_7      D OFF/ON      8  266 14 0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 7"
1008 1008 DNP_DIGSIMP_10_8      D OFF/ON      8  267 14 0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 8"
1009 1009 DNP_DIGSIMP_10_9      D OFF/ON      8  74  0  0  E  10  0  1.000000  0.000000  0  1  1  1.00 "DNP10~Binary~Input 9"
1999  999  DNP_DIGSIMP_20_COMMST  D OFF/ON      8  73  0  0  E  20  0  1.000000  -1.000000  0  1  1  0.00 "DNP20~Binary~Comm Status"
2000 1000 DNP_DIGSIMP_20_0      D OFF/ON      8  73  0  0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 0"
2001 1001 DNP_DIGSIMP_20_1      D OFF/ON      8  53  5  0  E  20  0  1.000000  0.000000  0  1  2  1.00 "DNP20~Binary~Input 1"
2002 1002 DNP_DIGSIMP_20_2      D OFF/ON      8  53  1  0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 2"
2003 1003 DNP_DIGSIMP_20_3      D OFF/ON      8  42  31 0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 3"
2004 1004 DNP_DIGSIMP_20_4      D OFF/ON      8  43  31 0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 4"
2005 1005 DNP_DIGSIMP_20_5      D OFF/ON      8  75  14 0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 5"
2006 1006 DNP_DIGSIMP_20_6      D OFF/ON      8  48  14 0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 6"
2007 1007 DNP_DIGSIMP_20_7      D OFF/ON      8  266 14 0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 7"
2008 1008 DNP_DIGSIMP_20_8      D OFF/ON      8  267 14 0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 8"
2009 1009 DNP_DIGSIMP_20_9      D OFF/ON      8  74  0  0  E  20  0  1.000000  0.000000  0  1  1  1.00 "DNP20~Binary~Input 9"
2999  999  DNP_DIGSIMP_30_COMMST  D OFF/ON      8  73  0  0  E  30  0  1.000000  -1.000000  0  1  1  0.00 "DNP30~Binary~Comm Status"
3000 1000 DNP_DIGSIMP_30_0      D OFF/ON      8  73  0  0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 0"
3001 1001 DNP_DIGSIMP_30_1      D OFF/ON      8  53  5  0  E  30  0  1.000000  0.000000  0  1  2  1.00 "DNP30~Binary~Input 1"
3002 1002 DNP_DIGSIMP_30_2      D OFF/ON      8  53  1  0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 2"
3003 1003 DNP_DIGSIMP_30_3      D OFF/ON      8  42  31 0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 3"
3004 1004 DNP_DIGSIMP_30_4      D OFF/ON      8  43  31 0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 4"
3005 1005 DNP_DIGSIMP_30_5      D OFF/ON      8  75  14 0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 5"
3006 1006 DNP_DIGSIMP_30_6      D OFF/ON      8  48  14 0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 6"
3007 1007 DNP_DIGSIMP_30_7      D OFF/ON      8  266 14 0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 7"
3008 1008 DNP_DIGSIMP_30_8      D OFF/ON      8  267 14 0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 8"
3009 1009 DNP_DIGSIMP_30_9      D OFF/ON      8  74  0  0  E  30  0  1.000000  0.000000  0  1  1  1.00 "DNP30~Binary~Input 9"
10000 90000 DNP_DIGCMD_10_0-----K D Open/Close 92 28 0 7 E 10 45 0.000000 0.000000 1000 2 1 0.00 "DNP10~Binary~Output0~Cmd"
10001 90001 DNP_DIGCMD_10_1-----K D Open/Close 92 28 0 7 E 10 45 0.000000 0.000000 1001 2 1 0.00 "DNP10~Binary~Output1~Cmd"
20000 90000 DNP_DIGCMD_20_0-----K D Open/Close 92 28 0 7 E 20 45 1.000000 1.000000 2000 2 1 0.00 "DNP20~Binary~Output0~Cmd"
20001 90001 DNP_DIGCMD_20_1-----K D Open/Close 92 28 0 7 E 20 45 1.000000 2.000000 2001 2 1 0.00 "DNP20~Binary~Output1~Cmd"
30000 90000 DNP_DIGCMD_30_0-----K D Open/Close 92 28 0 7 E 30 45 0.000000 0.000000 3000 2 1 0.00 "DNP30~Binary~Output0~Cmd"
30001 90001 DNP_DIGCMD_30_1-----K D Open/Close 92 28 0 7 E 30 45 0.000000 0.000000 3001 2 1 0.00 "DNP30~Binary~Output1~Cmd"

```