Technical Note

ProSoft TECHNOLOGY

PLX82-MNET-61850

Performance Measurement

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Contents

Overview

Introduction

The purpose of this document is to report the PLX82-MNET-61850 performance measurement results. The test evaluates how the module performance is affected by number of data attributes and number of IEDs.

Hardware Requirements

The following table indicates the equipment required for the tests:

Part Number	Quantity	Short Description	Vendor	Application
PLX82-MNET-61850	3	EUT	Prosoft Technology	Equipment Under Test
S80 SEPAM	2	IED	Schneider Electric	IED for report performance measurement
SEL-751A	1	IED	Schweitzer Engineering Laboratories	IED for MMS performance measurement
F650 By Controller	1	IED	GE	IED for GOOSE performance measurement
CPU65160	1	Modbus TCP/IP server	Schneider Electric	Modbus TCP/IP server

Software Requirements

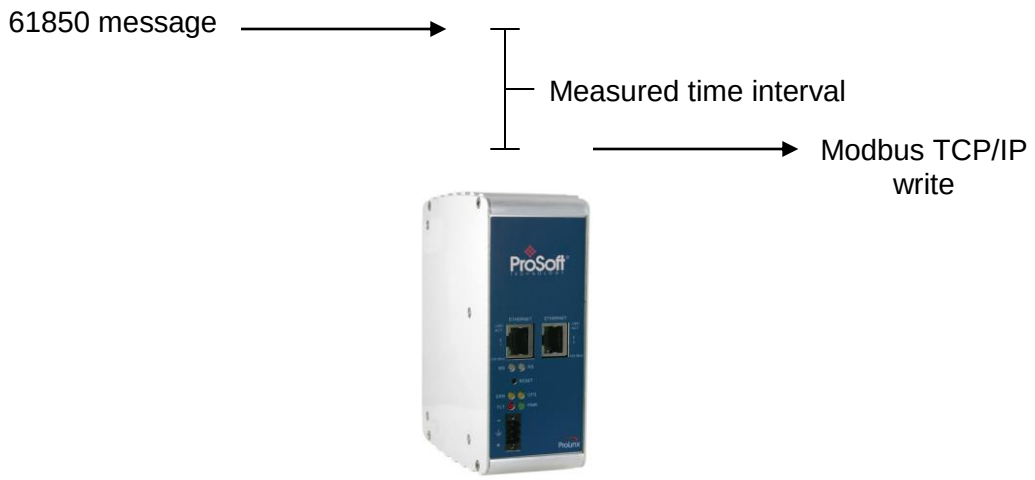
The following table indicates the software required for the tests:

Software	Vendor	Version	Application
Prosoft 61850 Configuration Manager	Prosoft Technology	1.0.0.96	Module configurator
Anvil	Triangle Microworks	3.00.0022	IED Simulator
Ethereal	Ethereal	1.1.0	Data capture
SFT850	Schneider Electric	2.0.28	Schneider IED configuration
AcSelerator Architect	SEL	1.1.98	SEL IED configuration

Overview

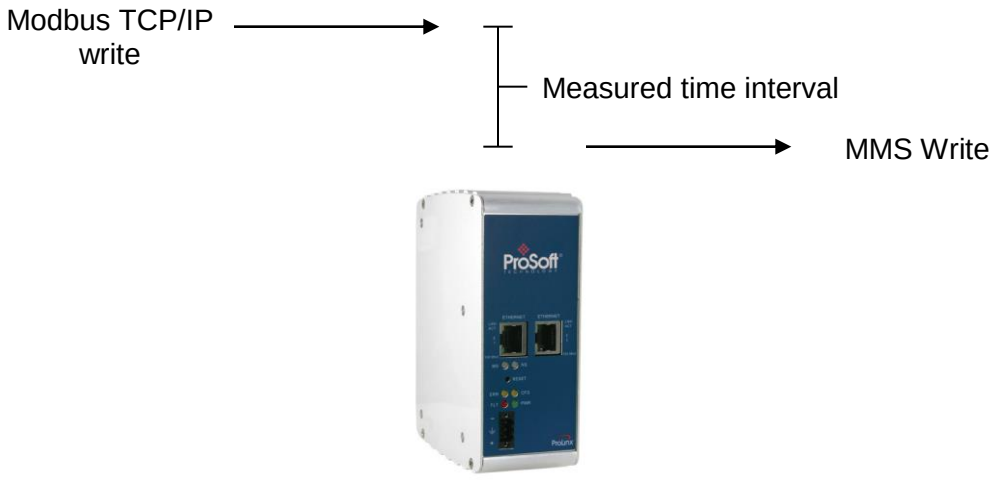
Performance Measurement

In monitoring direction: it was measured the time interval between receiving a 61850 message from the IED (MMS read, report and GOOSE) and sending the Modbus TCP/IP write message to the server :



Note: Performance results on the EtherNet/IP products (PLX81-EIP-61850 and PLX82-EIP-61850) have no relationship with MBTCP performance results.

In controlling direction: it was measured the time interval between the module receiving a Modbus TCP/IP write request and sending MMS write operation to a controllable data attribute in the IED:



The time interval is measured through data capture analysis. The tests are measured for two scenarios:

Performance according to number of data attributes

It was measured the performance while increasing the number of data attributes for the same IED.

Performance according to number of IEDs

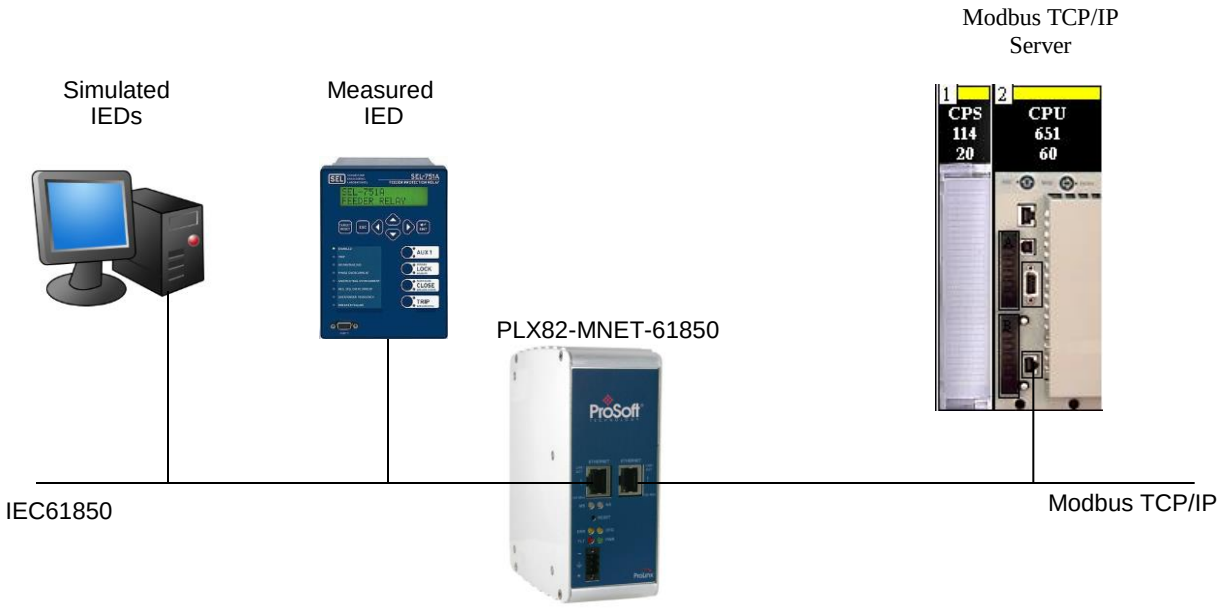
Measures the performance while increasing the number of IEDs . The performance is measured for a real IED while the IED count is increased by adding simulated IEDs to the network.

The following IEDs were used according to the IEC-61850 message type:

Message Type	IED	Number of test repetitions
GOOSE	SEPAM S80	20
Report	SEPAM S80	20
MMS Read	SEL-751A	20
MMS Write	SEPAM S80	10

Test Setup

The performance is measured using a real IED according to the previous section. For the tests that requires more than one IED it was used simulated IEDs. The Unity processor (Schneider Electric) was used as a Modbus TCP/IP server:



Test Results

MMS Read Tests

According to number of IEDs

Number of IEDs	Minimum (ms)	Maximum (ms)	Average (ms)
1	3.960	21.880	13.199
2	4.568	22.776	15.358
5	5.602	22.559	11.612
20	6.678	54.861	20.220
45	18.989	1105.8	37.655

According to number of Data Attributes

Number of DAs	Minimum (ms)	Maximum (ms)	Average (ms)
1	7.900	31.483	15.975
2	7.085	25.220	14.704
5	7.115	32.642	16.758
50	6.988	24.234	16.597
100	6.166	30.010	18.714

Report Tests

According to number of IEDs

Number of IEDs	Minimum (ms)	Maximum (ms)	Average (ms)
1	3.336	4.356	3.553
2	3.385	4.604	3.729
5	3.676	5.692	4.682
20	4.295	204.69	48.601
45	13.892	764.504	213.895

According to number of Data Attributes

Number of DAs	Minimum (ms)	Maximum (ms)	Average (ms)
1	3.293	5.115	3.678
2	3.569	11.006	6.362
5	4.313	24.390	12.762
50	16.151	54.868	22.210
100	10.262	84.906	50.645

GOOSE Tests

According to number of IEDs

Number of IEDs	Minimum (ms)	Maximum (ms)	Average (ms)
1	2.155	3.747	2.643
2	2.176	63.050	14.903
5	2.181	226.238	36.529
20	648.320	3440.307	1755.598
45	2254.365	4575.712	3525.888

According to number of Data Attributes

Number of DAs	Minimum (ms)	Maximum (ms)	Average (ms)
5	2.180	63.050	14.900
50	15.908	1251.192	1051.487
100	33.784	1204.699	798.204

MMS Write Tests

According to number of IEDs

Number of IEDs	Minimum (ms)	Maximum (ms)	Average (ms)
1	4.0	11.0	7.0
20	4.0	14.0	8.0
45	13.0	262.0	17.0