GE

Grid Solutions

IEC 61850 Client (DCA) for MCP

Conformance Statement

NTEK-A027M-0CS

Version 2.00 Revision 2

Associated Software Release: Version 2.00

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Contents

1. Protocol Implementation Conformance Statement (PICS)

1.1 GENERAL

The Multifunction Controller Platform (MCP) is a family of individual branded product names, with G500 being one of them.

The following ACSI conformance statements are used to provide an overview and details about G500 with firmware version 2.0:

- ACSI basic conformance statement
- ACSI models conformance statement
- ACSI service conformance statement

The tables in this document are identical to those given in IEC® 61850-7-2, except for the Value/comments column. This column shows the compliance of the MCP IEC 61850 Client to the ACSI.

1.2 ACSI Basic Conformance Statement

The basic conformance statement is defined as below:

Table 1.1: ACSI Basic Conformance Statement

		Client/ subscriber	Server/ publisher	Value/ comments
DCA-server roles				
B11	**Server** side (of TWO-PARTY-APPLICATION-ASSOCIATION)	–	c1	**No**
B12	**Client** side of (TWO-PARTY-APPLICATION-ASSOCIATION)	c1	–	**Yes**
SCSMs supported				
B21	**SCSM**: IEC 61850-8-1 used			**Yes**
B22	**SCSM**: IEC 61850-9-1 used			**No**
B23	**SCSM**: IEC 61850-9-2 used			**No**
B24	**SCSM**: other			**No**
Generic substation event model (GSE)				
B31	**Publisher** side	–	O	**No**

		Client/ subscriber	Server/ publisher	Value/ comments
B32	**Subscriber** side	O	–	**No**
Transmission of sampled value model (SVC)				
B41	**Publisher** side	–	O	**No**
B42	**Subscriber** side	O	–	**No**
c1 – shall be 'M' if support for **logical-device** model has been declared. O – Optional M – Mandatory				

1.3 ACSI Models Conformance Statement

The ACSI models conformance statement shall be as defined below:

Table 1.2: ACSI Models Conformance Statement

		Client/ subscriber	Server/ publisher	Value/ comments
If Server side (B11) or DCA side (B12) supported				
M1	**Logical device**	c2	c2	**Yes**
M2	**Logical node**	c3	c3	**Yes**
M3	**Data**	c4	c4	**Yes**
M4	**Data set**	c5	c5	**Yes**
M5	**Substitution**	O	O	**No**
M6	**Setting group control**	O	O	**No**
Reporting				
M7	**Buffered report control**	O	O	**Yes**
M7-1	sequence-number			**Yes**
M7-2	report-time-stamp			**Yes**
M7-3	reason-for-inclusion			**Yes**
M7-4	data-set-name			**Yes**
M7-5	data-reference			**Yes**
M7-6	buffer-overflow			**Yes**
M7-7	entryID			**Yes**
M7-8	BufTm			**Yes**
M7-9	IntgPd			**Yes**
M7-10	GI			**Yes**

		Client/ subscriber	Server/ publisher	Value/ comments
M7-11	conf-revision			**No**
M8	**Unbuffered report control**	O	O	**Yes**
M8-1	sequence-number			**Yes**
M8-2	report-time-stamp			**Yes**
M8-3	reason-for-inclusion			**Yes**
M8-4	data-set-name			**Yes**
M8-5	data-reference			**Yes**
M8-6	BufTm			**Yes**
M8-7	IntgPd			**Yes**
M8-8	GI			**Yes**
M8-9	conf-revision			**No**
	Logging	O	O	**No**
M9	**Log control**	O	O	**No**
M9-1	IntgPd			**No**
M10	**Log**	O	O	**No**
M11	**Control**	M	M	**Yes**
If GSE (B31/B32) is supported				
M12	**GOOSE**	O	O	**No**
M13	**GSSE**	O	O	**deprecated**
If SVC (B41/B42) is supported				
M14	Multicast SVC	O	O	**No**
M15	Unicast SVC	O	O	**No**
For all IEDs				
M16	**Time**	M	M	**N/A**
M17	**File Transfer**	O	O	**Yes**

c2 – shall be 'M' if support for **LOGICAL-NODE** model has been declared.
c3 – shall be 'M' if support for **DATA** model has been declared.
c4 – shall be 'M' if support for **DATA-SET**, Substitution, Report, Log Control, or Time model has been declared.
c5 – shall be 'M' if support for Report, GSE, or SV models has been declared.

M – Mandatory

O-Optional

1.4 ACSI Service Conformance Statement

The ACSI service conformance statement shall be as defined below:

Table 1.3: ACSI Services Conformance Statement

	Services	AA: TP/MC	Client/ subscriber	Server/ publisher	Comments Value	Ed
Server (Clause 7)						
S1	ServerDirectory	TP		M	**No**	**1,2**
Application association (Clause 8)						
S2	Associate		M	M	**Yes**	**1,2**
S3	Abort		M	M	**Yes**	**1,2**
S4	Release		M	M	**Yes**	**1,2**
Logical device (Clause 9)						
S5	LogicalDeviceDirectory	TP	M	M	**No**	**1,2**
Logical node (Clause 10)						
S6	LogicalNodeDirectory	TP	M	M	**No**	**1,2**
S7	GetAllDataValues	TP	O	M	**No**	**1,2**
Data (Clause 11)						
S8	GetDataValues	TP	M	M	**Yes**	**1,2**
S9	SetDataValues	TP	O	O	**Yes**	**1,2**
S10	GetDataDirectory	TP	O	M	**No**	**1,2**
S11	GetDataDefinition	TP	O	M	**Yes**	**1,2**
Data set (Clause 12)						
S12	GetDataSetValues	TP	O	M	**Yes**	**1,2**
S13	SetDataSetValues	TP	O	O	**No**	**1,2**
S14	CreateDataSet	TP	O	O	**Yes**	**1,2**
S15	DeleteDataSet	TP	O	O	**Yes**	**1,2**
S16	GetDataSetDirectory	TP	O	O	**No**	**1,2**
Substitution						
S17	SetDataValues	TP	M	M	**No**	**1**
Setting group control (Clause 16)						
S18	SelectActiveSG	TP	O	O	**No**	**1,2**
S19	SelectEditSG	TP	O	O	**No**	**1,2**
S20	SetSGValues	TP	O	O	**No**	**1,2**
S21	ConfirmEditSGValues	TP	O	O	**No**	**1,2**
S22	GetSGValues	TP	O	O	**No**	**1,2**
S23	GetSGCBValues	TP	O	O	**No**	**1,2**

	Services	AA: TP/MC	Client/ subscriber	Server/ publisher	Comments Value	Ed
Reporting (Clause 17)						
Buffered report control block (BRCB)						
S24	Report	TP	c6	c6	**Yes**	**1,2**
S24-1	data-change (dchg)				**Yes**	**1,2**
S24-2	qchg-change (qchg)				**Yes**	**1,2**
S24-3	data-update (dupd)				**Yes**	**1,2**
S25	GetBRCBValues	TP	c6	c6	**Yes**	**1,2**
S26	SetBRCBValues	TP	c6	c6	**Yes**	**1,2**
Unbuffered report control block (URCB)						
S27	Report	TP	c6	c6	**Yes**	**1,2**
S27-1	data-change (dchg)				**Yes**	**1,2**
S27-2	qchg-change (qchg)				**Yes**	**1,2**
S27-3	data-update (dupd)				**Yes**	**1,2**
S28	GetURCBValues	TP	c6	c6	**Yes**	**1,2**
S29	SetURCBValues	TP	c6	c6	**Yes**	**1,2**
c6 – shall declare support for at least one (BRCB or URCB).						
Logging (Clause 17)						
Log control block						
S30	GetLCBValues	TP	M	M	**No**	**1,2**
S31	SetLCBValues	TP	O	M	**No**	**1,2**
Log						
S32	QueryLogByTime	TP	c7	M	**No**	**1,2**
S33	QueryLogAfter	TP	c7	M	**No**	**1,2**
S34	GetLogStatusValues	TP	M	M	**No**	**1,2**
c7 – shall declare support for at least one (QueryLogByTime or QueryLogAfter).						
Generic substation event model (GSE) (14.3.5.3.4)						
GOOSE-CONTROL-BLOCK						
S35	SendGOOSEMessage	MC	c8	c8	**No**	**1,2**
S36	GetGoReference	TP	O	c9	**No**	**1,2**
S37	GetGOOSEElementNumber	TP	O	c9	**No**	**1,2**
S38	GetGoCBValues	TP	O	O	**No**	**1,2**
S39	SetGoCBValues	TP	O	O	**No**	**1,2**
GSSE-CONTROL-BLOCK						
S40	SendGSSEMessage	MC	c8	c8	**No**	**1**

	Services	AA: TP/MC	Client/ subscriber	Server/ publisher	Comments Value	Ed
						Deprecated in Ed2
S41	GetGsReference	TP	O	c9	**No**	**1 Deprecated in Ed2**
S42	GetGSSEElementNumber	TP	O	c9	**No**	**1 Deprecated in Ed2**
S43	GetGsCBValues	TP	O	O	**No**	**1 Deprecated in Ed2**
S44	SetGsCBValues	TP	O	O	**No**	**1 Deprecated in Ed2**
c8 – shall declare support for at least one (SendGOOSEMessage or SendGSSEMessage). c9 – shall declare support if TP association is available.						
Transmission of sampled value model (SVC) (Clause 19)						
Multicast SVC						
S45	SendMSVMessage	MC	c10	c10	**No**	**1,2**
S46	GetMSVCBValues	TP	O	O	**No**	**1,2**
S47	SetMSVCBValues	TP	O	O	**No**	**1,2**
Unicast SVC						
S48	SendUSVMessage	TP	c10	c10	**No**	**1,2**
S49	GetUSVCBValues	TP	O	O	**No**	**1,2**
S50	SetUSVCBValues	TP	O	O	**No**	**1,2**
c10 – shall declare support for at least one (SendMSVMessage or SendUSVMessage).						
Control (Clause 20)						
S51	Select		M	O	**Yes**	**1,2**
S52	SelectWithValue	TP	M	O	**Yes**	**1,2**
S53	Cancel	TP	O	O	**Yes**	**1,2**
S54	Operate	TP	M	M	**Yes**	**1,2**
S55	Command-Termination	TP	M	O	**Yes**	**1,2**
S56	TimeActivated-Operate	TP	O	O	**No**	**1,2**
File transfer (Clause 23)						
S57	GetFile	TP	O	M	**Yes**	**1,2**

	Services	AA: TP/MC	Client/ subscriber	Server/ publisher	Comments Value	Ed
S58	SetFile	TP	O	O	**No**	**1,2**
S59	DeleteFile	TP	O	O	**No**	**1,2**
S60	GetFileAttributeValues	TP	O	M	**Yes**	**1,2**
Time (5.5)						
T1	Time resolution of internal clock				Nearest negative power of 2 in seconds: **10**	**1,2**
T2	Time accuracy of internal clock				T0	**1,2**
					T1	**1,2**
					T2	**1,2**
					T3	**1,2**
					T4	**1,2**
					T5	**1,2**
T3	Supported TimeStamp resolution				Nearest value of 2**-n in seconds according to 5.5.3.7.3.3: **10**	**1,2**

2. Model Implementation Conformance Statement (MICS)

2.1 Introduction

This model implementation conformance statement is applicable for the IEC 61850 client interface in G500 Firmware Version 2.00. This MICS document specifies the supported Common Data Classes for IEC 61850 Edition 1 and Edition 2.

Note: MICS template taken from 1p0p1_rev1, which is current latest released document.

Note: When a CDC is supported it is assumed that all mandatory and optional attributes are supported. All exceptions should be mentioned in the comment column.

2.2 SUPPORTED COMMON DATA CLASSES

2.2.1 Common data class specifications for status information

CDC	Ed	Description	Supported	Comment
SPS	1,2	Single point status	Y	
DPS	1,2	Double point status	Y	
INS	1,2	Integer status	Y	
ENS	1,2	Enumerated status	Y	
ACT	1,2	Protection activation information	Y	
ACD	1,2	Directional protection activation information	Y	
SEC	1,2	Security violation counting	Y	
BCR	1	Binary counter reading	Y	
BCR	2	Binary counter reading	N	
HST	1,2	Histogram	N	
VSS	1,2	Visible string status	N	
Notes:				

2.2.2 Common data class specifications for measurement information

CDC	Ed	Description	Supported	Comment
MV	1,2	Measured value	Y	
CMV	1,2	Complex measured value	Y	
SAV	1,2	Sampled value	N	
WYE	1,2	Phase to ground/neutral related measured values of a three-phase system	Y	
DEL	1,2	Phase to phase related measured values of a three-phase system	Y	
SEQ	1,2	Sequence	Y	
HMV	1	Harmonic value	Y	

HMV	2	Harmonic value	Y	
HWYE	1	Harmonic value for WYE	Y	
HWYE	2	Harmonic value for WYE	Y	
HDEL	1	Harmonic value for DEL	Y	
HDEL	2	Harmonic value for DEL	Y	
Notes:				

NOTE: It is assumed that when a CDC is supported, all supported control models as specified in the PIXIT are supported. Please specify exceptions in the comment's column.

2.2.3 Common data class specifications for controls

CDC	Ed	Description	Supported	Comment
SPC	1,2	Controllable single point	Y	
DPC	1,2	Controllable double point	Y	
INC	1,2	Controllable integer status	Y	
ENC	1,2	Controllable enumerated status	Y	
BSC	1,2	Binary controlled step position information	Y	
ISC	1,2	Integer controlled step position information	Y	
APC	1	Controllable analogue process value	Y	
APC	2	Controllable analogue process value	Y	
BAC	1,2	Binary controlled analog process value	N	
Notes:				

2.2.4 Common data class specifications for status settings

CDC	Ed	Description	Supported	Comment
SPG	1,2	Single point setting	N	
ING	1,2	Integer status setting	N	
ENG	1,2	Enumerated status setting	N	
ORG	1,2	Object reference setting	N	
TSG	1,2	Time setting group	N	
CUG	2	Currency setting group	N	
VSG	2	Visible string setting	N	
Notes:				

2.2.5 Common data class specifications for analogue settings

CDC	Ed	Description	Supported	Comment
ASG	1,2	Analogue setting	N	
CURVE	1,2	Setting curve	N	
CSG	1,2	Curve shape setting	N	
Notes:				

2.2.6 Common data class specifications for description information

CDC	Ed	Description	Supported	Comment
DPL	1,2	Device name plate	N	
LPL	1,2	Logical node name plate	N	
CSD	1,2	Curve shape description	N	
Notes:				

2.2.7 Common data class specifications for tracking

CDC	Ed	Description	Supported	Comment
CST	2	Common service tracking	N	
BTS	2	Buffered report tracking service	N	
CTS	2	Control tracking service	N	
GTS	2	GOOSE Control block tracking service	N	
LTS	2	Log control block tracking service	N	
MTS	2	MSVCB tracking service	N	
NTS	2	USVCB control block tracking service	N	
OTS	2	Log tracking service	N	
STS	2	SGCB tracking service	N	
UTS	2	Unbuffered report tracking service	N	
Notes:				

Supported:

Y = Client can issue an ASCI service on this CDC and process the data from/to the CDC

N = Client can't issue an ASCI service on this CDC and doesn't process the data from/to the CDC

3. Protocol Implementation eXtra Information for Testing (PIXIT)

3.1 Introduction

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in the client system: "<G500>" with version "<2.00>", further referred to as "client".

Together with the PICS and the MICS the PIXIT forms the basis for a conformance test according to IEC 61850-10.

The following chapters specify the PIXIT for each applicable ACSI service model as structured in IEC 61850-10 and the "Conformance Test Procedures for Client System with IEC 61850-8-1 interface".

3.2 PIXIT for Configuration

ID	Ed	Description	Value / Clarification
Cf1	1,2	Describe how the client handles nameplate configuration revision mismatches	Not Supported
Cf2	1,2	Describe how the client handles report control block configuration revision mismatches	Not Supported

3.3 PIXIT for Association model

ID	Ed	Description	Value / Clarification
As1	1,2	Guaranteed number of servers that can set-up an association simultaneously (one association per server)	500 (for Model G500-B - 4 core APU, 16 GB RAM) 250 (for Model G500-A - 2 core APU, 8 GB RAM)
As2	1,2	Lost connection detection time range (default range of TCP_KEEPALIVE is 1 – 20 seconds)	7200 seconds
As3	1,2	Describe the behavior when association fails	Retry after configured no of Seconds. Default time is 30 seconds. But user can configure using config tool.
As4	3	Is authentication supported	N

As5	1,2	What is the maximum and minimum MMS PDU size.	Max MMS PDU size: It is a configuration parameter. Default is 32 KB Range: 64 to 262144
As6	1,2	What is the typical startup time after a power supply interrupt.	Time from power on to initialization complete is 2-3 minutes. After device startup, the device database points will initially be Invalid and Offline; Analog and Accumulator points will have zero value, and Digital Inputs will be OFF. Once association is established with the IED, the points will reflect the quality and value reported by the IED and Digital Outputs and Analog Outputs will be Online. Note that the device doesn't persist the point database so after restart, the points will again revert as indicated above: "After device startup".
As7	1,2	How does the client disconnect from the server?	Restart of device or device enable/disable option in HMI

3.4 PIXIT for Server model

ID	Ed	Description	Value / Clarification
Sr1	1,2	Maximum object identification length.	96 octets (32/64).
Sr2	1,2	Does client support auto description.	Not supported
Sr3	1,2	Describe how to view data values.	Data values can be viewed using Device Local HMI or Remote HMI
Sr4	1,2	What analogue value (MX) quality bits are used in the client.	Y Good, Y Invalid, Y Reserved, Y Questionable Y Overflow Y OutofRange Y BadReference Y Oscillatory Y Failure Y OldData N Inconsistent N Inaccurate Y Process Y Substituted Y Test Y OperatorBlocked

Sr5	1,2	Which status value (ST) quality bits are used in the client	Y Good, Y Invalid, Y Reserved, Y Questionable Y BadReference Y Oscillatory Y Failure Y OldData N Inconsistent N Inaccurate Y Process Y Substituted Y Test Y OperatorBlocked
Sr6	1,2	Describe how to view/display quality values	Quality Values can be viewed using the HMI. Use shmsingle command line tool for viewing test flag.
Sr7	1,2	Describe how to force a SetDataValues request	Enable the CF parameter write option in the Loader (Config tool) and issue a control to IED from Local HMI and user shall see PulseConfig attributes in a SetDataValues request.
Sr8	1,2	Describe how to force a GetDataValues request	GetDataValues request can be issued from Device HMI using pseudo point command and can be polled with a configurable interval
Sr9	1,2	Describe how to force a GetAllDataValues request	Not Supported
Sr10	1,2	Does the client support writing blkEna values?	N
ID	Ed	Description	Value / Clarification
Sr11	1,2	Describe how the client behaves in case of: - GetDataDefinition response- - GetDataDefinition response+ with more or less attributes as expected - GetLogicalDeviceDirectory response- - GetAllDataValues response- - GetAllDataValues response+ with more or less attributes as expected - GetDataValues response- - GetDataValues response+ with more or less attributes as expected - SetDataValues response-	All are Not Supported
Sr12	1,2	Which time quality attributes from the server are used in the client	N Leap Second Known, N ClockFailure Y Clock not synchronized

			N Accuracy
Sr13	1,2	Describe how to view time quality attributes	Use shmsingle command line tool

3.5 PIXIT for Data set model

ID	Ed	Description	Value / Clarification
Ds1	1,2	Describe how to force a GetDataSetValues request	GetDataSetValues request can be issued from Device HMI using pseudo point command
Ds2	1,2	Describe how to force a SetDataSetValues request	Not Supported
Ds3	1,2	Describe how to force a DeleteDataSet request	If the IED has a mismatched dataset, then the devjce will try to delete the dataset and then create a dynamic dataset.
Ds4	1,2	Describe how the client handles following dataset mismatches between the SCL and the data sets exposed via MMS: (1) new dataset element (2) missing dataset element (3) Reordered dataset members in a dataset of a different data type (4) Reordered dataset members in a dataset of the same data type	Device logs a message in its diagnostic log, tries to delete the dataset and then create a dynamic dataset.
Ds5	1,2	Describe how the client behaves in case of: - GetLogicalNodeDirectory(DATA-SET) response- - GetDataSetDirectory response- - GetDataSetValues response- - SetDataSetValues response-	Not Supported except GetDataSetValues. In the case of GetDataSetValues response, device logs a message in its diagnostic log and then marks the database points as Questionable and OldData.
Ds6	1,2	Maximum name length for dataset Maximum name length for dataset member, including LD and FC	<32/11$32> <32/61+3>
Ds11	1,2	Describe how to force a CreateDataSet request - non-persistent - persistent	For both types: CreateDataSet request will be issued automatically by the Device if it detects any mismatch between configured dataset using SCL file and IED supported Dataset through MMS requests. The new dataset shall always be persistent
Ds12	1,2	Describe how to force a DeleteDataSet request - non-persistent - persistent	For both types: Delete DataSet request will be issued automatically by the Device if it detects any mismatch between configured dataset using SCL file and IED supported Dataset through MMS requests. The new dataset shall always be persistent
Ds13	1,2	Describe how the client behaves in case of: - CreateDataSet response- - DeleteDataSet response-	Device logs the message in its diagnostic log and will revert to polling using the GetDataValues service

3.6 PIXIT for Substitution model

ID	Ed	Description	Value / Clarification
Sub1	1,2	Describe how to substitute a value	Not Supported

3.7 PIXIT for Setting group control model

ID	Ed	Description	Value / Clarification
Sg1	1,2	How can the client be forced to send a GetLogicalNodeDirectory(SGCB) request	Not Supported
Sg2	1,2	Describe how to change the active setting group	Not Supported
Sg3	1,2	Describe how to get the actual setting group values	Not Supported
Sg4	1,2	Describe how to edit setting group values	Not Supported
Sg5	1,2	Describe how the client behaves in case of: - GetSGCBValues response- - SelectEditSG response- - SetEditSGValue response- - SelectActiveSG response- - ConfirmEditSGValues response- - The configured SG differs from the actual setting group	Not Supported
Sg6		Does the client read the optional ResvTms value?	Not supported

3.8 PIXIT for Reporting model

ID	Ed	Description	Value / Clarification
Rp1	1,2	Does the client search for RCB in all logical nodes? If not, specify the logical nodes	No Client does not search for RCB. It directly accesses the pre-configured RCB's
Rp2	1,2	Which dynamic RCB attributes are/can be configured by the client	RptID Y DataSet Y Optional fields Y Trigger conditions Y Buffer time Y Integrity period Y
Rp3	1,2	Does the client supports IED's with indexed and non-indexed report control blocks (RCB)	BRCB indexed Y BRCB not indexed Y URCB indexed Y UCB not indexed Y

Rp4	1,2	The supported trigger conditions are	integrity Y data change Y quality change Y data update Y general interrogation Y
Rp5	1,2	The minimum required optional fields are	sequence-number N report-time-stamp Y reason-for-inclusion Y data-set-name N data-reference N buffer-overflow Y entryID Y confRev N
Rp6	1,2	Does the client support segmented reports	Y
Rp7	1	Does the client support pre-assigned RCB	N
Rp8	1,2	Does the client support reported data set containing structured data objects or data attributes?	reporting of data objects Y reporting of data attributes Y
Rp9	1,2	Describe how the client does respond when an previously used URCB is reserved by another client for: • Indexed URCB with max>1 configured in SCL (static reporting) • Indexed URCB with max=1 configured in SCL (static reporting) • URCB not configured in SCL (dynamic reporting	First two bullets, client will continue to retry until URCB is available. Client does not support last bullet.
Rp10	1,2	Describe how the client does respond when an previously used BRCB is reserved by another client for: • Indexed BRCB with max>1 configured in SCL (static reporting) • Indexed BRCB with max=1 configured in SCL (static reporting) • BRCB not configured in SCL (dynamic reporting	First two bullets, client will continue to retry until BRCB is available. Client does not support last bullet
Rp11	1,2	Describe how the client does respond on a SetBRCBValues(EntryID) respond-	No special processing. The Client will always issue a write to the GI during RCB initialization.

Rp12	1,2	Describe how the client does respond when a report has an unknown: dataset, RptID, unexpected number of dataset entries, and/or unexpected data type format entries	The client will accept any report that has a matching RptID and will process all expected dataset entries. It will ignore unexpected dataset entries. However, it will accept a report with a different dataset name if the RptID and dataset entries match the expected values.
Rp13	1,2	Describe how the client detects reporting configuration changes (mismatches). Does it check the "configuration revision" attributes and/or does it check the dataset members? Is the dataset update done online or offline?	Check ConfRev N Check dataset members Y Dataset update online or offline: **Online** If device supports deleting and creating of a dataset, update of dataset elements are Online else Offline)
Rp14	1,2	Describe how to force the client to change the RCB buffer time	Client will automatically write the RCB buffer time on startup based on the configuration.
Rp15	1,2	Does client set server TrgOps.GI prior to first issuance of GI command?	Y
Rp16	1,2	Describe how to force the client to send the GI request	Operate the Retrieve All Datasets pseudo DO point for the IED from the device HMI.
Rp17	1,2	Describe how to force the client to enable a RCB	It is done automatically based on the configuration
Rp18	1,2	Describe how the client does respond when a report control block is renamed or deleted - Does it prevent reading the deleted RCB - If it reads the missing RCB, how does it handle the GetURCBValues or GetBRCBValues response-	Device will continue to retry reading the RCB. A message shall be logged in the diagnostic log on response-
Rp19	1,2	Describe how the client behaves in case of: - SetURCBValues response- - Unsupported optional fields - Unsupported trigger condition(s)	Device will continue to retry reading the RCB. Device will write the optional fields and trigger conditions as part of its initialization procedure, so the last two bullets are not applicable.
Rp20	1,2	Describe how the client behaves in case of: - Buffer overflow	Device sets the Reporting Buffer Overflow DI pseudo point, which can be viewed in the HMI. Device sets the GI data attribute n the Buffered RCB.
Rp21	1,2	Describe how to force the client to send SetBRCBValues request for - EntryID - PurgeBuf	After the device has received at least one report, restart the device and it will write the EntryID received from the last report as part of initialization of the remote server. The device will never send a PurgeBuf.
Rp22	1,2	Does the client support writing resvTms	Y
Rp23	1,2	Does the client support reading owner	N
Rp24	2	Does the device function only as test equipment?	N

3.9 PIXIT for Logging model

ID	Ed	Description	Value / Clarification
Lg1	1,2	Does the client search for LCB in all logical nodes? when not specify the logical nodes	Not Supported
Lg2	1,2	Describe how to change LCB attributes	Not Supported
Lg3	1,2	Describe how to force the client to enable a LCB	Not Supported
Lg4	1	Does the client support sending QueryLogByTime and/or QueryLogAfter	Not Supported
Lg5	2	Describe how to force the client to change GLOG settings	Not Supported
Lg6	1,2	Describe how the client behaves in case of: - Renamed LCB - Removed LCB - Renamed Logical Device - Renamed LOG	Not Supported
Lg7	1,2	Describe how the client behaves in case of: - GetLCBValues response- - GetLogStatusValues response- - SetLCBValues response-	Not Supported

3.10 PIXIT for GOOSE control block model

ID	Ed	Description	Value / Clarification
		<additional items>	Not supported

3.11 PIXIT for Control model

ID	Ed	Description	Value / Clarification
Ctl1	1,2	What control modes are supported	Y status-only Y direct-with-normal-security Y sbo-with-normal-security Y direct-with-enhanced-security Y sbo-with-enhanced-security
Ctl2	1,2	Is Time activated operate (operTm) supported	N
Ctl3	1,2	Is “operate-many” supported	Y
Ctl4	1,2	Can the client set the test flag?	Y
Ctl5	1,2	What check conditions can be set	Y synchrocheck Y interlock-check
Ctl6	1,2	Which originator categories are supported and what is the originator identification?	Orcat **Station control, Remote control,** and **Automatic Station Control** is supported OrIdent is **D400**
Ctl7	1,2	Describe if and how the client sets/increments the ctlNum	It is incremented each time a new sequence control is done

Ctl8	1,2	What does the client when it receives a LastApplicationError and describe how to view the additional cause?	It displays the AddCause on its HMI
Ctl9	1,2	What does the client when its receives a Select, SelectWithValue or Operate respond negative ?	It displays the AddCause on its HMI
Ctl10	1,2	Can the client change the control model via online services?	No
Ctl11	1	What does the client when the ctlModel is not initialized in the SCL?	It retrieves the ctlModel from the IED
Ctl12	1,2	What does the client when the ctlModel in SCD and in SERVER SIMULATOR is different?	It uses retrieved ctlModel from the IED
Ctl13	1,2	Describe how to view a - CommandTermination request+ - CommandTermination request- - TimeActivatedOperateTermination request+ and request-	Command Termination request positive and negative responses will be logged by the client in its log file. The AddCause of the CommandTermination will be displayed in the HMI.

3.12 PIXIT for Time and time synchronization model

ID	Ed	Description	Value / Clarification
Tm1	1,2	Describe how to view the internal time & quality or how to expose the timestamp and timestamp quality via the IEC 61850 interface	View: timestamp can be viewed on HMI Expose: for example, in Operate request
Tm2	1,2	What time quality bits are supported	N LeapSecondsKnown N ClockFailure N ClockNotSynchronized
Tm3	1,2	What is the behavior when the time synchronization signal/messages are lost	No change in behavior.
Tm4	1,2	When is the quality bit "Clock failure" set?	Not Supported
Tm5	1	When is the quality bit "Clock not synchronized" set?	Not Supported

3.13 PIXIT for File transfer model

ID	Ed	Description	Value / Clarification
Ft1	1,2	Describe when or how to force the client to request GetServerDirectory(FILE) and what it does with the responded filenames	The test configuration includes the ARRM application configured to retrieve files from a simulated IED defined in the test gateway IID file using the RDRE logical node and the RcdMade DI point. The ARRM application will automatically request the IEC 61850 client to retrieve new files whenever the RcdMade DI toggles.

			Toggle the RcdMade DI on the server simulator. The device will issue the request and then retrieve new files that were not retrieved since the last RcdMade DI change.
Ft2	1,2	Does the client uses a wildcard in the GetServerDirectory(FILE) request	Y, wildcard = "*"
Ft3	1,2	Does the client support IED's that include the path in the file name in the GetServerDirectory(FILE) respond?	N path included Y path not included
Ft4	1,2	Does the client support IED's that use the file separator	Y "/" N "\"
Ft5	1,2	What is the maximum file name size including path	160
Ft6	1,2	Can the client read a file with size 0	Y
Ft7	1,2	Are directory/file names case sensitive	Case sensitive
Ft8	1,2	Maximum file size	100M
Ft9	1,2	Describe how the client behaves in case of: - GetFile response- - GetFileAttributes response- - SetFile response-	Device will log a message in the device diagnostic log and abort the file transfer. SetFile is not supported.

3.14 PIXIT for Service Tracking Model

ID	Ed	Description	Value / Clarification
Tr1	2	Which tracking services are supported by the client: - BrcbTrk - UrcbTrk - LocbTrk - GocbTrk - MsvcbTrk - UsvcbTrk - SgcbTrk - SpcTrk - DpcTrk - IncTrk - EncTrk - ApcFTrk - ApcIntTrk - BscTrk - IscTrk - BacTrk - GenTrk	 N N N N N N N N N N N N N N N N N N N
Tr2	2	Describe how to view the tracking objects or their attributes	Not supported

4. TISSUES Implementation Conformance Statement (TICS)

4.1 Introduction

This tissue implementation conformance statement is applicable for the IEC 61850 client interface in G500 Firmware Version 2.00. According to the UCA IUG QAP the Tissue conformance statement is required to perform a conformance test and is referenced on the certificate.

4.2 Mandatory Edition 2 Tissues

Below tables give an overview of the applicable mandatory Tissues.

"Supported by client":

"**Y**": means that the client supports servers that have implemented the respective tissue.

"**ni**": No impact on testing

"**na**": not applicable if the client does not support the corresponding ACSI service(s)

4.2.1 Part 6 Tissue List

Part 6 Tissue	Description	Supported by client
658	Tracking related features	na
663	FCDA element cannot be a "functionally constrained logical node"	Y
668	Autotransformer modeling	na
719	ConfDataSet - maxAttributes definition is confusing	Y
721	Log element name	na
768	bType VisString65 is missing	Y
779	object references	Y
788	SICS S56 from optional to mandatory	na
789	ConfLdName as services applies to both server and client (supportsLdname)	na
804	valKind and IED versus System configuration (valimport)	Y
806	Max length of log name inconsistent between -6 and -7-2	ni
807	Need a way to indicate if "Owner" present in RCB	Y
822	Extension of IED capabilities	Y
823	ValKind for structured data attributes	Y
824	Short addresses on structured data attributes	Y
825	Floating point value	Y
845	SGCB ResvTms	na
853	SBO and ProtNs	Y

855	Recursive SubFunction	na
856	VoltageLevel frequency and phases	ni
857	Function/SubFunction for ConductingEquipment	na
886	Missing 8-1 P-types	na
901	tServices as AP or as IED element	Y
936	SupSubscription parameter usage is difficult	na
1175	IPv6 address lowercase only	na

4.2.2 Part 7-1 Tissue List

Part 7-1 Tissue	Description	Supported by client
828	Data model namespace revision IEC 61850-7-4:2007[A]	Y
1151	simulated GOOSE disappears after 1st appearance when LPHD.Sim = TRUE	na
1196	Extensions to standardized LN classes made by third parties Note: this tissue is not final yet	na

4.2.3 Part 7-2 Tissue List

Part 7-2 Tissue	Description	Supported by client
778	AddCause values – add value not-supported	Y
780	What are unsupported trigger option at a control block?	Y
783	TimOper Resp- ; add Authorization check	na
786	AddCause values 26 and 27 are switched	Y
820	Mandatory ACSI services (use for PICS template)	Y
858	typo in enumeration ServiceType	ni
861	dchg of ConfRev attribute	na
876	GenLogiclNodeClass and SGCB, GoCB, MsvCB, UsvCB	ni
1038	Loss of Info Detection After Resynch	Y
1062	Entrytime not used in CDC	ni
1071	Length of DO name	ni
1091	The sentence "The initial value of EditSG shall be 0", has to be stated in part 7.2 not in 8.1	na
1127	Missing owner attribute in BTS and UTS	na
1163	Old report in URCB	ni
1202	GI not optional	ni

4.2.4 Part 7-3 Tissue List

Part 7-3 Tissue	Description	Supported by client
697	persistent command / PulseConfig	Y
698	Wrong case is BAC.dB attribute	na
722	Units for 'h' and 'min' not in UnitKind enumeration.	ni
919	Presence Condition for sVC	ni
925	Presence of i or f attribute - Problem with writing	Y
926	Presence Conditions within RangeConfig	na

4.2.5 Part 7-4 Tissue List

Part 7-4 Tissue	Description	Supported by client
671	mistake in definition of Mod & Beh	Y
674	CDC of ZRRC.LocSta is wrong	na
675	SIML LN	ni
676	Same data object name used with different CDC	na
677	MotStr is used with different CDC in PMMS and SOPM LN classes	na
679	Remove CycTrMod Enum	na
680	SI unit for MHYD.Cndct	ni
681	Enum PIDAlg	ni
682	ANCR.ParColMod	ni
683	Enum QVVR.IntrDetMth	ni
685	Enum ParTraMod	ni
686	New annex H - enums types in XML	Y
694	Data object CmdBlk	ni
696	LSVS.St (Status of subscription)	ni
712	interpretation of quality operatorBlocked	Y
713	DO Naming of time constants in FFIL	na
724	ANCR.Auto	na
725	Loc in LN A-group	Y
734	LLN0.OpTmh vs. LPHD.OpTmh	na
735	ISAF.Alm and ISAF.AlmReset	na
736	PFSign	na
742	GAPC.Str, GAPC.Op and GAPC.StrVal	Y
743	CCGR.PmpCtl and CCGR.FanCtl	na
744	LN STMP, EEHealth and EEName	na
772	LPHD.PwrUp/PwrDn shall be transient	Y
773	Loc, LocKey and LocSta YPSH and YLTC	Y
774	ITCI.LocKey	na
775	KVLV.ClsLim and OpnLim	ni
776	LPHD.OutOv/InOv and LCCH.OutOv/InOv	ni
800	Misspelling in CSYN	na
802	CCGR and Harmonized control authority	na
808	Presence condition of ZMOT.DExt and new DOs	na
831	Setting of ConfRevNum in LGOS	na
838	Testing in Beh=Blocked	Y
844	MFLK.PhPiMax, MFLK.PhPiLoFil, MFLK.PhPiRoot DEL->WYE	na
849	Presence conditions re-assessing in case of derived statistical calculation	na
877	QVUB -settings should be optional	na
909	Remove ANCR.ColOpR and ColOpL	na
920	Resetable Counter is NOT resetable	Y
932	Rename AVCO.SptVol to AVCO.VolSpt	na
939	Change CDC for ANCR.FixCol	na
991	LGOS: GoCBRef (as well as LSVS.SvCBRef) should be mandatory	ni
1007	PTRC as fault indicator - Update of description required	ni
1044	TapChg in AVCO	na
1077	Rename DOnames within LTIM	na

Note: Tissues 675, 735, 772, 775, 776, 878 are not relevant for conformance testing.

4.2.6 Part 8-1 Tissue List

Part 8-1 Tissue	Description	Supported by client
784	Tracking of control (CTS)	na
817	Fixed-length GOOSE float encoding	ni
834	File dir name length 64	Y
951	Encoding of Owner attribute	Y
1040	More associate error codes	Y
1178	Select Response+ is non-null value	Y

Compare the TISSUE database for more details: www.tissues.iec61850.com

MODIFICATION RECORD

VERSION	REV.	DATE	Author	Change Description
1.00	0	2nd May, 2019	G. LaMarre	Created.
2.00	0	11th May, 2020	N. Kandula	Updated PICS for Ed2, appended MICS/PIXIT/TICS.
	1	13th May, 2020	G. LaMarre	Updated PIXIT for Association Model, PIXIT for File transfer model.
	2	3rd June, 2020	N. Kandula	Updated PIXIT for Dataset Model, PIXIT for Server Model, PIXIT for Reporting Model, ACSI Service Conformance Statement.
			B. Popescu	Added clarification about MCP family and G500.