

KALKI Substation Gateway

Version 2.0 ,July-2009

1. Overview

Kalki Sub-Station Gateway Lite Family of Products enable Utility's to easily and seamlessly modernize their Sub-Station Infrastructure in a systematic and graded manner, without loss of control and monitoring capabilities, with minimal cost implications.

The family of products support up to 16 Serial and 2 Ethernet Port's, and a maximum of 10000 I/O Points. All KSGGL Family products' come with Device Server Capability as well as Transparent Port Capability.

2. Basic Features

The KSGGL Family of product features include:

- Sub-Station Gateway
- Secure Communications (AES / DES / 3DES / SSL)
- Protocol Conversion

- Data Concentrator
- Device Server / Terminal Server
- Transparent Port for IED
- Parameterization
- PSTN/GPRS/CDMA/RF Modem Optional Support
- Windows Based Common Configuration & Diagnostic Utility

3. Protocol Support

The KSGGL Family Supports the following Protocols by default (Category S Protocols):

- DNP3 Serial Master/Slave
- DNP3 Network Master/Slave
- IEC 61850 Client/Server
- IEC 60870-5-101 Master/Slave
- IEC 60870-5-103 Master/Slave
- IEC 60870-5-104 Master/Slave
- IEC 60870-6 ICCP TASE2 Client/Server
- Modbus RTU Serial Master/Slave
- Modbus TCP Master/Slave
- ABB SPA Master
- ABB RP570 Master
- Alstom Courier Master
- DLMS / IEC 62056
- Custom Protocol Support on request

4. Product Variations

The KSGGL Family Products are as follows:

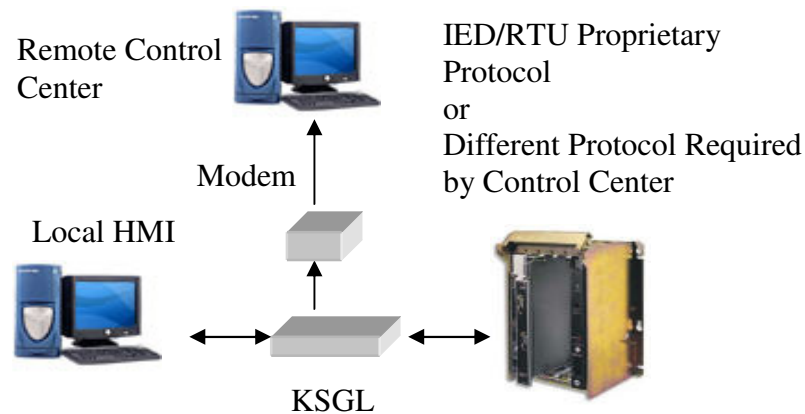
- KSGGL-S6R1 – 2/4/6 Serial ports having 2KV surge and 4kV fast transient protections & 1 Ethernet 10/100 Copper RJ45 Port
- KSGGL-S6F1 – 2/4/6 Serial ports having 2KV surge and 4kV fast transient protections & 1 Ethernet 100-Base-FX Port (ST connector)
- KSGGL-S4R2 – 4 Serial (not isolated) & 2 Ethernet 10/100 Copper RJ45 Port
- KSGGL-S8R2 – 8 Serial (not isolated) & 2 Ethernet 10/100 Copper RJ45 Ports
- KSGGL-S16R4 – 16 Serial (not isolated) & 4 Ethernet 10/100 Copper RJ45 Ports
- KSGGL-S16R4I – 16 Serial (with 2 kV isolation) & 4 Ethernet 10/100 Copper RJ45 Ports

5. Configuration Utility

“**EasyConnect**” configuration utility is used for the configuration of KSGGL. It provides facility for Configuration, Database creation & protocol mapping with detailed diagnostics.

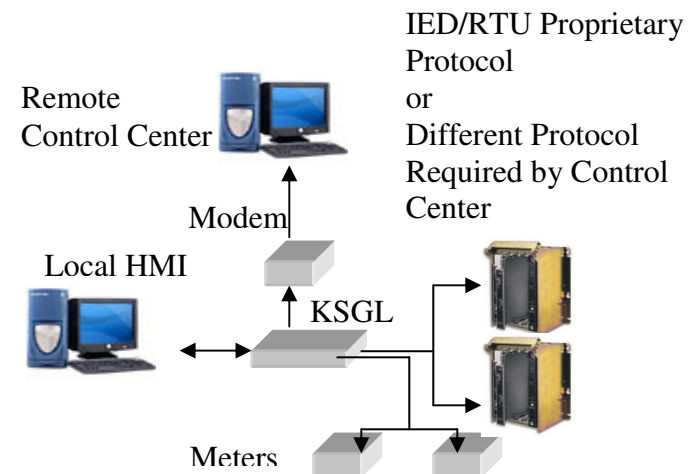
6. Applications

6.1. Protocol Converter



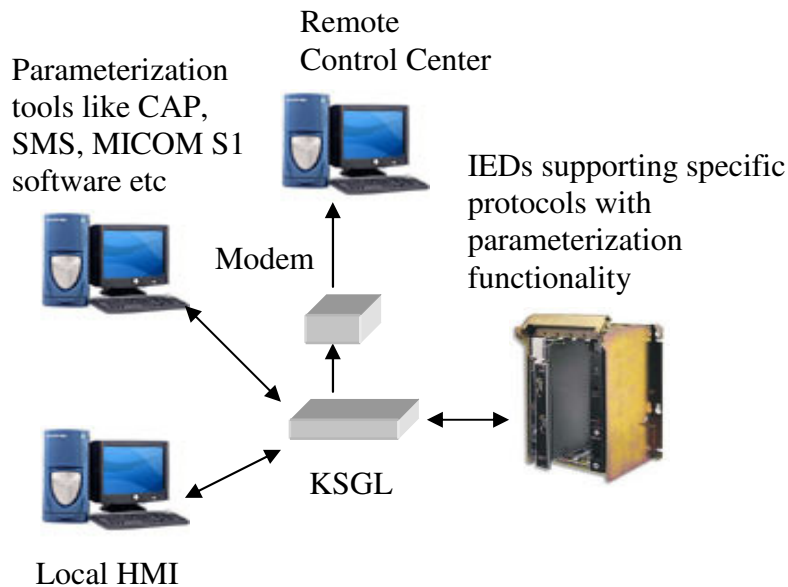
This feature enables the conversions of data from any slave device (protocol –X) to any master device (protocol –Y). KSGM also facilitates one to one, one to many, many to one and many to many conversions. Facility is also given for connectivity to remote control centers through modem. The details of ‘X’ & ‘Y’ protocols available in KSGM are listed in Protocol Support section. (Section 3)

6.2. Sub-Station Data Concentrator



KSGM can act as data concentrator to collect the data from various devices. The external master devices can take the data from KSGM as if they are communicating with the single slave device. KSGM also supports data concentrator feature with protocol conversion functionalities.

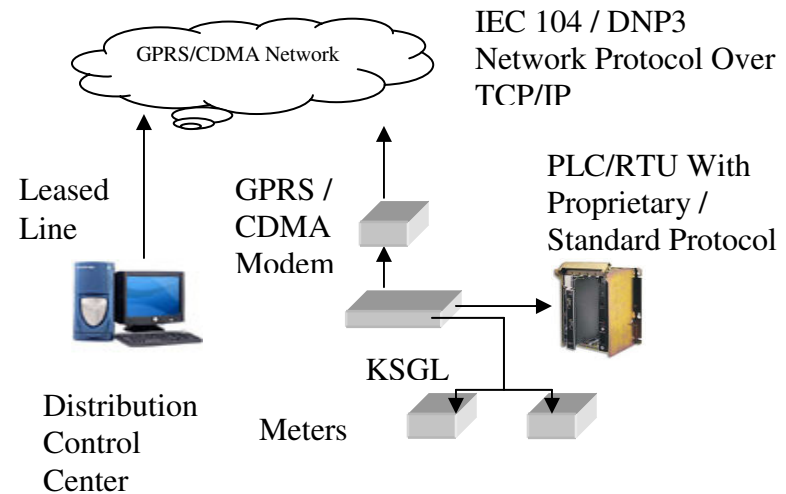
6.3. Protocol Converter with pass-through Functionality



KSGM can have special pass through channels for the parameterization / disturbance uploading functionalities with the IEDs. In this, KSGM will do two major functions parallel.

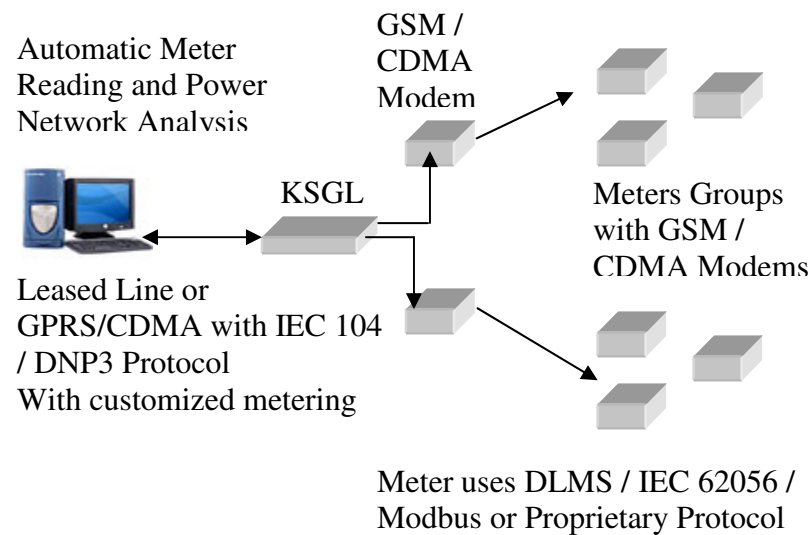
- Convert the normal protection & measurand data from the IEDs to the compatible protocol format required for the HMI
- Passes the messages from transparent channel (parameterization channel) directly to the IEDS.

6.4. RMU / Feeder RTU / Transformer Monitoring and Automation



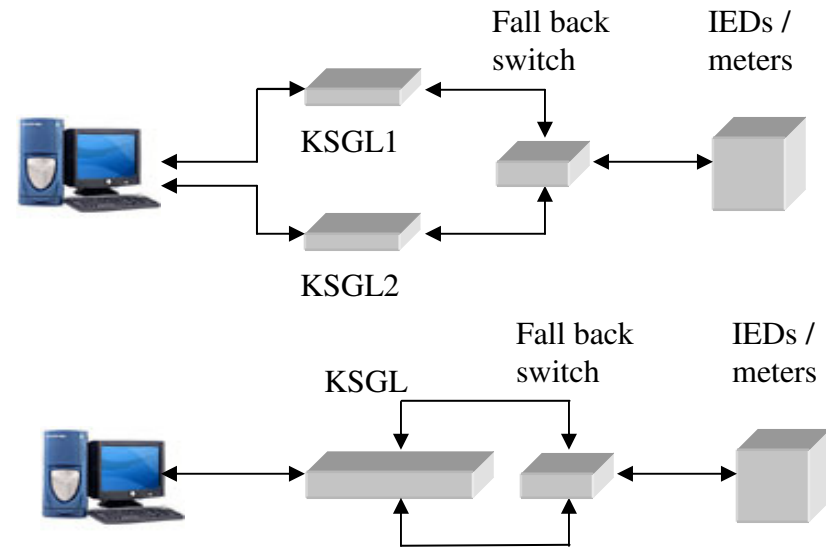
KSGM can collect the data from various devices of the substation and pass the entire data to the distribution control center through GPRS / CDMA modem connectivity.

6.5. Automatic Metering & Management Solutions



KSGl can read the data from meters with GSM / CDMA modems and pass this data to provide automatic metering and power network analysis functionalities.

6.6. Redundant FEPs



KSGl supports redundancy for both the serial & Ethernet connectivity & for all the available protocols. We can have module redundancy or channel redundancy. In module redundancy, switchover takes place between two KSGl modules whereas in channel redundancy switchover takes place between channels in the same KSGl, which are configured as redundant.

7. KSG L Specifications

Topic	Feature	KSG L-S6R1	KSG L-S6F1	KSG L-S4R2	KSG L-8R2	KSG L-S16R4	KSG L-S16-R4I
Communication	Only RS232	0/2, DBG	0/2, DBG	DBG	DBG	DBG	DBG
	RS232/RS485	2/4	2/4	4	8	16	16 with 2.5kV isolation
	RS422/RS485	-	-	-	-	-	-
	Network/Ethernet Port	1 (RJ45)	1 (FO-ST connector)	2 (Copper RJ45)	2 (Copper RJ45)	4 (Copper RJ45)	4 (Copper RJ45)
	Maintenance	Ethernet Port, DBG	Ethernet Port, DBG	Ethernet Port, DBG	Ethernet Port, DBG	Ethernet Port, DBG	Ethernet Port, DBG
Software Configuration	Configuration & Mapping	Y	Y	Y	Y	Y	Y
	Multi - Protocol Support	Y	Y	Y	Y	Y	Y
	Master/Slave Mode	Y	Y	Y	Y	Y	Y
	Point Counts	800 for IEC61850 & 3,000 for others	800 for IEC61850 & 3,000 for others	1500 for IEC61850 & 5,000 for others	2000 for IEC61850 & 6,000 for others	3000 for IEC61850 & 10,000 for others	3000 for IEC61850 & 10,000 for others
	Diagnostics	Y	Y	Y	Y	Y	Y
Applications	Protocol Translator	Y	Y	Y	Y	Y	Y
	Multi-Port Gateway	Y	Y	Y	Y	Y	Y
	Data Concentrator	Y	Y	Y	Y	Y	Y
	Network Transport & Device Server	Y	Y	Y	Y	Y	Y
	Pass Through Port	Y	Y	Y	Y	Y	Y
Hardware / Mounting	Processor	ARM9 CPU	ARM9 CPU	ARM9 32-bit RISC CPU	X Scale IXP-422	X Scale IXP-425	X Scale IXP-425
	Clock Cycle	190 MHz	190 MHz	190 MHz	266 MHz	533 MHz	533 MHz
	Power Consumption	15 W	15 W	15 W	15 W	15 W	15 W
	Power Supply	24 VDC	24 VDC	24 VDC	24 VDC	Universal	Universal
	Temperature (Operating)	-20°-70°	-20°-70°	-10°-60°	-10°-60°	-10°-60°	-10°-60°
	Humidity	95% RH	95% RH	90% RH	95% RH	95% RH	90% RH
	Dimensions	165 x 70 x 135 mms	165 x 70 x 135 mms	60 x 137 x 100 mms	197 x 125 x 44 mms	480 x 45 x 198 mms	480 x 45 x 198 mms
	Weight	650 g	650 g	430 g	870 g	2600 g	2600 g
	Mounting	DIN	DIN	DIN	DIN	RACK	RACK
	RAM	32 / 64 MB	32 / 64 MB	64 MB	128 MB	128 MB	128 MB
FLASH	256 MB	256 MB	16 MB	32 MB	32 MB	32 MB	

8. Test / Certifications

The following tests are applicable only for **KSGL-S6R1 & F1** types only.

IEC 61850-3 EMI TYPE TESTS				
Test	Description	Test Area	Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	+/- 8kV	4
		Enclosure Air	+/- 15kV	4
IEC 61000-4-3	Radiated RFI	Enclosure ports	20 V/m	x
		Signal ports	+/- 4kV @ 2.5kHz	x
IEC 61000-4-4	Burst (Fast Transient)	D.C. Power ports	+/- 4kV	4
		Earth ground ports 3	+/- 4kV	4
IEC 61000-4-5	Surge	Signal ports	+/- 4kV line-to-earth, +/- 2kV line-to-line	4
		D.C. Power ports	+/- 2kV line-to-earth, +/- 1kV line-to-line	3
		Signal ports	10V	3
IEC 61000-4-6	Induced (Conducted) RFI	D.C Power ports	10V	3
		A.C. Power ports	10V	3
		Earth ground ports 3	10V	3
IEC 61000-4-8	Magnetic Field	Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	N/A
IEC 61000-4-29	Voltage Dips & Interrupts	D.C. Power ports	30% for 0.1s, 60% for 0.1s, 100% for 0.05s	N/A
IEC 61000-4-12	Damped Oscillatory	Signal ports	2.5kV common, 1kV diff. mode@1MHz	3
		D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	3
IEC 61000-4-16	Mains Frequency Voltage	Signal ports	30V Continuous, 300V for 1s	4
		D.C. Power ports	30V Continuous, 300V for 1s	4
IEC 61000-4-17	Ripple on D.C. Power Supply	D.C. Power ports	10%	3
IEC 60255-5	Dielectric Strength	Signal ports	2kVac	N/A
		D.C. Power ports	2kVac	N/A
IEC 60255-5	H.V. Impulse	Signal ports	5kV	N/A
		D.C. Power ports	5kV	N/A

9. Protocol Support

The following code determines the protocol availability:

S - Protocol is supported and operational in the associated product and available at standard prices

R - Protocol is not yet implemented on the associated product, but available at standard prices

C - Protocol is not yet implemented on the associated product and requires special pricing

A - Protocol software and hardware realization services, consulting and training offered

N - Protocol is not yet implemented and is not available on the associated product or as an implementation service

Protocol	OEM	KPA	KSGL-S6R1	KSGL-S4R2	KSGL-S8R2	KSGL-S16R4	Product Realization Service
IEC							
IEC 61850	S	S	S	S	S	S	A
IEC 60870-5-101	S	S	S	S	S	S	A
IEC 60870-5-102	C	C	C	C	C	C	A
IEC 60870-5-103	S	S	S	S	S	S	A
IEC 60870-5-104	S	S	S	S	S	S	A
ICCP / TASE.2 (IEC 60870-6)	N	N	N	S	S	S	A
IEC 61400-25	N	N	S	S	S	S	A
IEC 61968	N	N	N	N	S	S	A
IEC 61970	N	N	N	N	S	S	A
DLMS/COSEM - IEC 62056	C	C	C	C	C	C	A
IEEE							
IEEE C37.118	S	S	S	S	S	S	A

Protocol Converter, Gateway and Data Concentrator Family

Protocol	OEM	KPA	KSGI-S6R1	KSGI-S4R2	KSGI-S8R2	KSGI-S16R4	Product Realization Service
IEEE 1344	N	N	N	R	R	R	A
DNP3 Org							
DNP3 Serial	S	S	S	S	S	S	A
DNP3 Network	S	S	S	S	S	S	A
SEL							
SEL 451	S	S	S	S	S	S	A
SEL 421	S	S	S	S	S	S	A
SEL 311A	S	S	S	S	S	S	A
SEL 421	S	S	S	S	S	S	A
SEL Others	S	S	S	S	S	S	A
SEL Fast Message	S	S	S	S	S	S	A
Schneider							
Modbus RTU - SEPAM	S	S	S	S	S	S	A
ABB							
SPA Bus	S	S	S	S	S	S	A
RP570	S	S	S	S	S	S	A
RP571	S	S	S	S	S	S	A
Indactic 33/1	C	C	C	C	C	C	A
Indactic 33/41	C	C	C	C	C	C	A
MicroSCADA CPI API	N	N	N	R	R	R	A
Areva							
Courier KBUS	N	N	N	S	S	S	A
Courier RS485	S	S	S	S	S	S	A
Industrial Protocols							
CANOpen	N	N	N	S	N	N	A
BACNet IP	S	S	S	S	S	S	A
Ethernet IP	R	R	S	S	S	S	A
DH+	C	C	C	C	C	C	A
Modbus RTU	S	S	S	S	S	S	A

Protocol Converter, Gateway and Data Concentrator Family

Protocol	OEM	KPA	KSG-L-S6R1	KSG-L-S4R2	KSG-L-S8R2	KSG-L-S16R4	Product Realization Service
Modbus ASCII	R	R	R	R	R	R	A
Modbus TCP/IP	S	S	S	S	S	S	A
Profibus DP Slave	R	R	S	R	R	R	A
Profibus DP Master	R	R	R	R	R	R	A
DeviceNet	C	C	C	C	C	C	A
ControlNet	C	C	C	C	C	C	A
DF1	R	R	R	R	R	R	A
OPC DA	S	S	S	S	S	S	A
Westinghouse							
Wisp+	C	C	C	C	C	C	A
Wisp++	C	C	C	C	C	C	A
Others							
Altus*	N	N	S	S	S	S	A
RTK	N	N	S	N	N	N	A
ODBC	N	N	N	S	S	S	A
CONITEL	C	C	C	C	C	C	A
GE SRTP	R	R	R	R	R	R	A
EXCOM	N	N	S	S	S	S	A
CMC Master	N	N	N	S	S	S	A
SPORT	N	N	S	S	S	S	A
Enron Modbus	R	R	R	R	R	R	A
Triguard P2P	N	N	S	S	S	S	A