Brief Introduction of Substation Automation Systems at SDSC SHAR
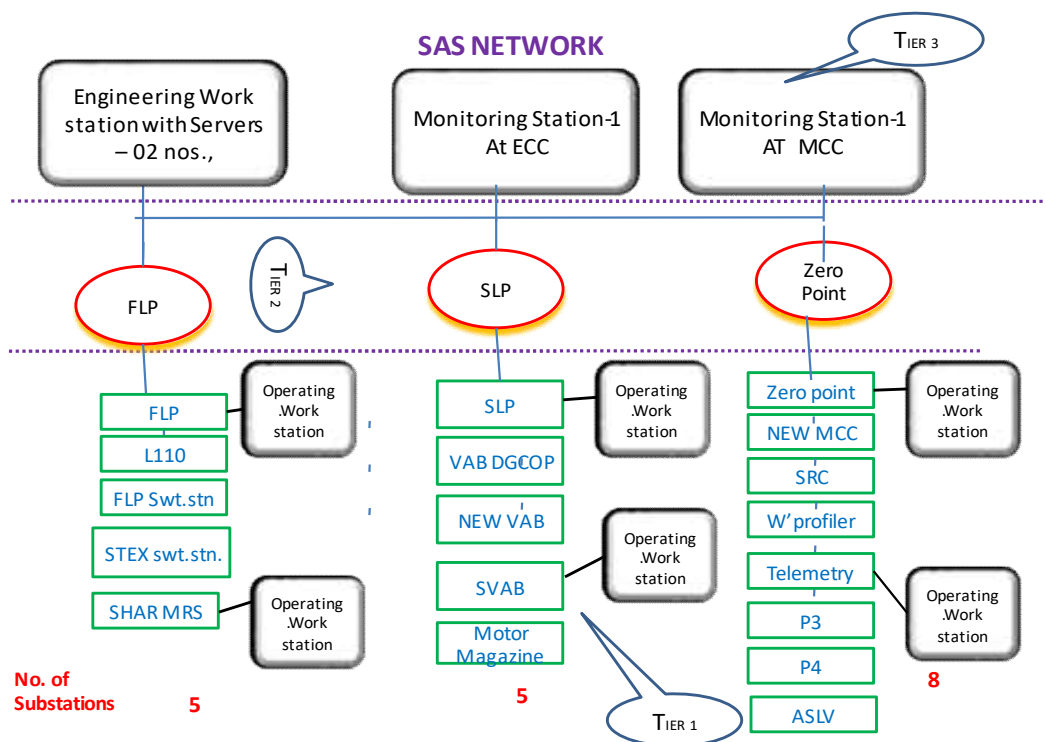
1. Substation Automation System (SAS) covers 18 nos., of substations at various locations of SDSC SHAR area viz., SHAR MRS, SMP&ETF, FLP, SLP, Zero point and Telemetry areas. These substations are divided into three nodes

   - Node1, FLP   : 05 substations
   - Node 2, SLP   : 05 substations
   - Node 3, Control Centre : 08 substations

   The total architecture is shown below.

1. Each Node consists of two Hot redundant PLCs withRIO racks, Micro PLCs and Operating work stations (OWS) as mentioned in the architecture and are loaded with allRockwell Automation related licenced software.

2. Details of PLCs used are as follows

   a. Make   :   Allen Bradley
   b. Model   :   **1756 L71**
   c. Digital I/O Max   :   128000
   d. Analog I/O Max   :   4000
   e. Controller Redundancy :   Hot standby

f. RIO make : Allen Bradley, Model No: AENT 1734 series B.

g. RS 485 communication PLCs: Allen Bradly make, Model: Micro 820.

3. SCADA specifications

    a. Make : Allen Bradley

    b. Type : STUDIO 5000

    c. No. of Tags : Unlimited

    d. Developer license : 02

    e. Run time license : 05

    f. Web license : 10

4. Specifications of servers used (02 Nos) at Engineering work stations (EWS) are

    a. Make & Model : DELL Power Edge R530

    b. Processer : 64 bit Xenon processor, E7-26094-4@1.7GHz

    c. RAM : 32 GB

    d. Hard drive : 4 x 1 TB

    e. Graphic card : Matrex G260ER

    f. OS : Windows Server 2016

5. Specifications of Operating work stations (OWS) are

    a. Make & Model : DELL Optoplex7050

    b. Processer : 64 bit i7 processor, I7-7700 @ 3.6GHz

    c. RAM : 8 GB

    d. Hard drive : 1 TB

    e. Graphic card : 1G Intel I219-LM

    f. OS : 64 bit Windows 10 professional

6. Software used : Rockwell Automation STUDIO 5000, Factory Talk view, Connected components etc.

7. Multi Function Meters provided at feeders are connected through Micro PLC to acquire data

8. The configuration of substation automation system at each node is as shown below.

CONFIGURATION OF SUBSTATION AUTOMATION SYSTEM
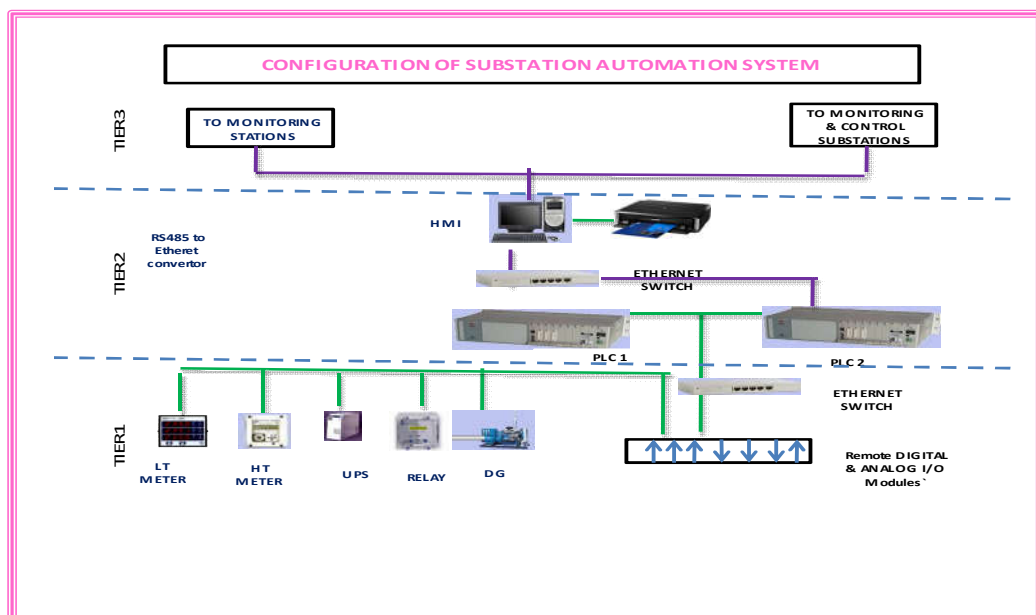
9. The following parameter are being acquired for 17 Nos of substations

- Voltage, current, frequency, power, power factor Energy
- DG parameters
- UPS parameters and status
- ON /OFF/TRIP Status of the VCBs & ACBs

10. Along with monitoring, ON/OFF Control of HT Vacuum Circuit Breakers and LT Air Circuit Breakers is available at all above substations.

11. Details of works to be carried out during AMC and Terms & conditions of AMC contract are enclosed as annexure I.

12. Typical checklists to be followed for carrying out preventive maintenance are enclosed as annexure II.

13. The systems are commissioned in 2019 and working satisfactorily.

14. The party may visit the site to have full understanding of the systems if required.

Terms & conditions of AMC

01. This Non Comprehensive Annual Maintenance Contract includes only preventive and break down maintenance and standby support as required for Substation Automation System.

02. <mark>OEM or **Authorized system integrator / service agencies of Allen bradley are only eligible to quote**</mark>. In case of authorized service agency, party shall submit valid OEM's authorization letter otherwise offer will be rejected.

03. The service team should have knowledge on of **Allen bradley** PLCs in hot redundant configuration and related SCADA softwares.

04. Non comprehensive AMC includes quarterly preventive maintenance, Launch pre checks visits on call / need basis and attending break down calls.

05. **Quarterly Preventive health checks:** The party shall depute their service engineer **once in every three months for a duration of 4 days.** During such visits he shall carry out system health checks, obtain reports back up and other works for the upkeep of system in good condition. Sample checklist is enclosed herewith.

06. **Pre- Check Visit / Need basis visits:** Apart from the quarterly visit, the party shall depute its personnel for carrying out preventive health check-ups for pre-launch or critical activity for a duration **of two days** (one day: 08 Hrs). This will be on call basis. Party shall depute their personnel based on the mail request from department. No. of launches anticipated: 10 per annum.

07. **Break down visit:** The party shall depute its service engineer in case of any break down with in 24Hrs time of reporting the breakdown during the AMC period. This will be exclusive of the quarterly and call basis AMC visits. Failure to rectify any breakdown beyond 48 hrs since it has been reported will result in levy of penalty @ 1% of AMC cost per annum for every week subject to maximum of 10%. The maximum breakdown calls per year is restricted to 03 Nos., only. This breakdown calls shall be attended free of cost.

08. The service engineer shall have minimum 3 years of experience in the field of work using PLC and SCADA. Department reserves the right to accept the service engineer's deputation for this AMC after evaluating his technical capability.

09. The party shall depute the service engineers who have technically evaluated and accepted for the AMC.

10. During AMC any issues / problems with hardware and software shall be rectified. Necessary hard wares will be supplied by Department. Network healthiness between substations and among elements will be ensured by Department.

11. During AMC, any minor additions, modifications required in the hardware and software shall be carried out. The required hardware materials will be supplied by us.

12. The party shall depute its service engineer in case of any break down with in 48 Hrs time of reporting the breakdown during the AMC period. This will be exclusive of the quarterly AMC visit. Failure to rectify any breakdown beyond 48 hrs since it has been reported will result in levy of penalty @ 1% of AMC cost per annum for every week subject to maximum of 10%.

13. Any modification in the SCADA screens at any OWS PCs, same shall be updated in all OWS & EWS PCs.

14. Accommodation will be provided by Department on **chargeable basis subjected to availability**. The cost quoted shall be inclusive of boarding, lodging and transportation charges. The party shall have their own mode of transportation between various substations.

15. The farthest distance between substations is 25 km. intra movement of personnel during the period of contract is in the scope of party only.

16. The party should adhere all the safety and security procedures available at SDSC SHAR.

17. The AMC is for **03** years from the date of release PO and if found satisfactory is extendable to another one year on mutually on agreeable basis at the same rate as on 3rd year.

18. Party shall carry out any firmware upgrade during period of contract as suggested to OEM to main and redundant PLCs. OEM shall support their channelled partner in this regard. If required, the party shall hire service engineer for firmware updation or it shall be carried out under the support of OEM only

19. Party shall submit the duly filled price bid format as enclosed in annexure III.

20. **Payment terms:** Payment will be made quarterly (once in three months) at the end of each quarter after producing invoice along with service reports and duly certified by Engineer in charge and Head ED, CMG.

Bi monthly Maintenance Sample Checklist for Substation Automation Systems

Location: **Node:**   **Date of visit:**

S.No	Particular	Status/ Remarks
	PLC & RIO panel Health verifications	
01.	Health checks of Main & Redundant PLCs.	
02.	Redundancy Verifications of PLCsat each Node.	
03.	Healthiness of MODBUS PLC / Micro PLC s	
04.	Healthiness ofRemote I/O Modules at each Node. No of RIO panels inspected at this Node: Visit each substation and check the healthiness of RIO panels.	
05.	Healthiness Digital I/O relays.	
	Power Supply Verifications	
06.	Healthiness of switchgears & terminations	
07.	Verify the Redundancy of UPS powers or 1KVA UPS healthiness. (Load shall be on UPS for 30 minutes)	
08.	Healthiness of SMPS power modules & load details Voltages: N-E voltage:	
09.	Functioning of Diode O – ring, 24 V DC	
10.	Check Indication lamps, Emergency OFF, Emergency lamps and Panel Cooling Fans Functioning	
	SCADA verifications	
11.	SLDs in SCADA screens,	
12.	MFM data displayed on screens No. of MFMs connected: Data acquired from ____ nos., of MFMs	
13.	Data acquiring from other devices like UPS, ASTS/., ASTC, Generator controller etc.,	
14.	Trend graphs of random meters' data is to be plotted for last two months as per the data. Ensure there is no break in the last two months Generate at least 10 trends on different days	
15.	Reports generation. Ensure there is no break in the last two months Generate at least 10 reports on different days.	
16.	Ensure sufficient memory available at each OWS PC. IO memory : Logic memory : Local disc space :	
17.	Reverify the above checks S.No 14 , 15 & 16 at EWS PC at ECC. Ensure that last three months data stored with overwriting old data. IO memory : Logic memory : Local disc space :	
18.	Complaints attended if any.	
19.	Modifications carried out if any	
20.	Obtain the user logged data and generate report	
Remarks:		

Dept. Engineer   **AMC Team.**

Price bid format

S.No	Item description	Qty	Rate	GST rate @ ___%	Total
1	**Non comprehensive AMC for SAS systems:** **Quarterly visit** to carryout preventive maintenance to SAS systems as per checklist given in annexure II for a duration of 04 days. **01 visit: 04 days**.	For visits / annum Total No. of visits : 12	-	-	-
1.1	**For First year**	04 Visits			
1.2	**For second Year**	04 Visits			
1.3	**For Third year**	04 Visits			
2	**Call / Need basis visits:** Carrying out pre-launch preventive health check-ups for a duration of two days. One job: **02** days for a duration of 08 Hrs each day.	30 Jobs			
				Grand Total	

* Note: L1 will be evaluated based on the total price

The price quoted for third year shall be binding for fourth year too if the order is extended.