

दूरभाष :
TELEPHONE :
तार : बार्क-मुंबई, चेम्बूर.
TELEGRAMS : BARC-MUMBAI, CHEMBUR.
फेक्स संख्या : ९१-२२-२५५० ५१५१
FAX NUMBER : 91-22-2550 5151



भारत सरकार
GOVERNMENT OF INDIA
भाभा परमाणु अनुसंधान केन्द्र
BHABHA ATOMIC RESEARCH CENTRE
Uranium Extraction Division
Project, Planning & Engineering Section



UED/ pl- 13/ 2022/ 25982

Date: 25/ 01/ 2022

Tender No.: BARC/ UED/ NDH/ 21141
Tender Due Date: 16/ 02/ 2022

(- - - - 2 – Part – Tender - - - -)

To,

Sub: Up-gradation, Programming & Integration of PLC based Data Acquisition & Plant Monitoring System, including Supply of Hardware, at UMRT&EH, RUMP & AUMP facilities.

Dear Sir,

Quotation on behalf of head, uranium extraction division, are invited in sealed envelope for the above-mentioned job, as per the following description & the scope of work:

1 System Outline:

- 1.1. The overall PLC system's architecture has been depicted in the block-diagram as per the attached Annexure- 1.
- 1.2. The purpose of the system is data acquisition & monitoring of our three facilities, namely UMRT&EH, RUMP & AUMP.
- 1.3. At UMRT&EH there is ECIL PLC & SCADA based network, comprising of 4 nos. of PLC stations located in operator rooms at floor levels- G, 1, 2, 3; and 1 no. control station at control room, located at ground floor of the building.
- 1.4. At AUMP there is one PLC station- R, which is geographically far away from the control room, and thus cannot be connected by direct network link. The connection needs to be established via BARC's existing intranet.

- 1.5. At RUMP there is Schneider Modicon Premium PLC based network with Vijeo Citect SCADA, from which the said ECIL make system has to acquire data, over fiber-optic MODBus-TCP communication network.
- 1.6. The fiber- Optic as well as the copper Ethernet network at shall be configured in, overall, “Hiper Ring” topology for network redundancy.
- 1.7. Following is the summary of various **EXISTING** physical I/O's, hardware & “relevant” devices available at various stations.

	<u>Quantity of Connected Physical I/O's.</u>					<u>Quantity of Devices</u>			
	<u>K-type -T/C Inputs</u>	<u>Analog Inputs</u>	<u>Discrete Inputs</u>	<u>Discrete Outputs</u>	<u>MODbus Slave Devices</u>	<u>Main-PLC-Processors</u>	<u>Main-Ethernet Switches</u>	<u>PLC- I/O Bus Processors</u>	<u>PC's</u>
Station- C (UMRT) (Control Room)	nil	nil	nil	nil	nil	nil	1 no. &	nil	2 nos. *
Station- G (UMRT) (Operator Room- G)	nil	31 nos.	192 nos.	59 nos.	nil	1 no.	1 no.	2 nos.	2 nos. #
Station- 1 (UMRT) (Operator Room- 1)	nil	44 nos.	200 nos.	57 nos.	4 nos.	1 no.	1 no.	2 nos.	2 nos. #
Station- 2 (UMRT) (Operator Room- 2)	nil	22 nos.	180 nos.	23 nos.	8 nos.	1 no.	1 no.	2 nos.	2 nos. #
Station- 3 (UMRT) (Operator Room- 3)	nil	10 nos.	66 nos.	8 nos.	nil	1 no.	1 no.	1 no.	1 no. #
Station- R (AUMP) (Remote Location)	8 nos. \$	9 nos.	61 nos.	nil	nil	1 no.	1 no.	nil	1 no. #

* Business Workstations; # Industrial Panel PC's; & Layer-3 with firewall; \$ Module to be supplied
ECIL make Hardware

- 1.8. Following is the summary of various **EXISTING** I/O's from RUMP's Schneider Modicom Premium PLC's / Vijeo Citect SCADA based network:

	<u>K-type -T/C Inputs</u>	<u>Analog Inputs</u>	<u>Discrete Inputs</u>	<u>Analog Outputs</u>	<u>Main-PLC-Processors</u>	<u>Main-Ethernet Switches</u>
Station- 1 (RUMP) (Compressor Area)	4 nos.	32 nos.	97 nos.	nil	1 no.	1 no.
Station- 2 (RUMP) (Furnace Area)	20 nos.	25 nos.	59 nos.	nil	1 no.	1 no.
Station- 3 (RUMP) (Active Corridor)	1 no.	32 nos.	10 nos.	8 nos.	1 no.	1 no.
Station- 4 (RUMP) (Control Room)	nil	nil	nil	nil	1 no.	1 no.

2 Scope of Supply:

As a part of the job, the party shall supply the following modules, components & hardware. Some of them shall be installed in the system (as mentioned under “scope-of-work”) as upgrades; while the remaining shall be kept as spares or any further upgrade or contingency requirements, for future:

- 2.1. Thermocouple Modules: 8-Channel, 16-bit or higher resolution, with in-built CJC, for “K” type thermocouple inputs, compatible for ECIL make EC-PLC platform: 2 Nos.
- 2.2. PLC Rack/ Control Backplane: 7 Slot, for Local I/O's, ECIL make, Part No.: ECCM-5007MB: 1 No.
- 2.3. PLC Rack/ Control Backplane: 11 Slot, for Local I/O's, ECIL make, Part No.: ECCM-5011MB: 1 No.
- 2.4. PLC Rack/ Control Backplane: 11 Slot, for Remote I/O's, ECIL make, Part No.: ECM-5011MB: 1 No.
- 2.5. Digital Input Module: 32-Channel, Sinking, 10-30Vdc, ECIL make, Part No.: ECM-5110: 6 Nos.
- 2.6. Digital Output Module: 32 channel, Sourcing, Current capacity: 140mA per channel / 250mA (total), at 24Vdc, ECIL make, Part No.: ECM-5201: 5 Nos.
- 2.7. Relay Boards for DO modules: 16 Channel, with 2C/O contacts per channel , 24Vdc, Phoenix Contact make: 9 Nos.
- 2.8. HMI/ SCADA "Run-time-View-Only" software with licenses for view-client PC's at control room, compatible with Microsoft Windows 8 pro, (or higher): 6 Nos.
- 2.9. Wires, connecting cables & rail-mount terminal-blocks for wiring & termination of additional I/O modules & relay cards; along with necessary hardware e.g. lugs, ferrules etc: 1 LOT.
- 2.10. Pigtails/ patch-cords for splice-termination of 62.5/ 125 μ m x 6- core, multi-mode, fiber-optic cable ends, Ethernet patch cords, Media Converters, Light-Interface Units (LIU's) etc.; as per requirement: 1 LOT
(*Please check the quantity available with UED, BARC under item no. 4 “Free-Issue Material” below.*)

3 Scope of Work:

- 3.1. Configuration of main-PLC processors (ECIL make) in Dual-Redundant pairs:
Pair-A: Station-G main processor with Station-1 main processor,
Pair-B: Station-1 main processor with Station-2 main processor.
- 3.2. Configuration & establishment of "Bi-Directional" data-connectivity of Station-R PLC processor (ECIL make) with SCADA Servers at Station-C, over BARC's

Intranet, using Network address translation (NAT) & IP masquerading, over two different connecting networks, via the **EXISTING** Layer-3 Managed Ethernet-Switch with Firewall.

- 3.3. Installation & configuration of 8-channel Thermocouple module (ECIL make) (1 No.) at Station-R PLC-rack.
- 3.4. Installation, configuration, wiring & termination (inside station panels) of 32-channel Digital-Output modules (ECIL make, ECM-5201) : 3 Nos.
- 3.5. Installation, configuration, wiring & termination (inside station panels) of 16-channel Relay-Boards for DO's: 6 Nos.
- 3.6. Configuration & establishment of "View-Only" data-display-connectivity from **EXISTING** PLC stations of RUMP (Schneider make Modicom Premium) to the SCADA Servers at Station-C, over fiber-optic MODBus-TCP communication.
- 3.7. Splicing Termination of 62.5/ 125 μ m x 6- core, multi-mode, fiber-optic cable ends, along with supply of necessary pigtails/ patch-cords, with installation of Light-Interface-Units (LIU's): 6 Sets. (*at 6 locations/ stations*).
- 3.8. Warm-Standby configuration of the SCADA software (ECIL make ECSCADA-V7.0) running in 2 nos. of business workstations; i.e. each one shall update its missing data from the other whenever it comes back to service.
- 3.9. Development of "Prototype" programs for alarm & control logic in SCADA software, based on inputs from UED, BARC.
- 3.10. Development of "Basic" SCADA screen "Prototypes" for "Tabular" display of process parameters for Stations- G, 1, 2, 3 & R, based on inputs from UED, BARC.
- 3.11. Development of "Basic" SCADA screen "Prototypes" for "Tabular" display of acquired process data from RUMP, via Schneider PLC & SCADA system, based on inputs from UED, BARC.
- 3.12. NOTE: Only prototype screens in tabular formats are required as "Templates" that shall be further populated, detailed & developed by UED, BARC.
- 3.13. Documentation of all development job followed by handing-over of the same to UED, BARC.

4 Free- Issue Material:

Apart from the hardware installed inside various PLC stations, as mentioned vide item nos. 1.7 & 1.8 above, following is the list of additional/ spare hardware that shall be provided by UED, BARC, **FREE-OF-CHARGE** for the job concerned, as & when required:

- 4.1. Media Converter Switch: Hirschmann Spider II Giga 5T/2S EEC, rail-mount - 5

Nos.

- 4.2. Fiber Ethernet Transceiver Ports: Hirschmann M-SFP-LX/LC - 14 Nos.
- 4.3. Rail Power Supply: 240AC- 24VDC, 0.6A, Hirschmann RPS 15, rail-mount - 10 Nos.
- 4.4. Industrial/ Managed Ethernet Switch: Hirschmann RS40 0009, rail-mount - 2 Nos.
- 4.5. Industrial Firewall/ Security Switch: Hirschmann Eagle 30, rail-mount - 1 No.
- 4.6. Light- Interface- Unit (LIU) for Fiber-Optic termination: 6-Port, complete with LC pigtails, splice-holders & trays, & PG glands – 5 Sets.

5 Testing & Acceptance:

Testing shall be performed at BARC with ECIL's presence. Testing instruments & devices to carry out the tests shall be generally provided by BARC. However, if any specific/ specialized instrument/ device were required, the same shall be arranged by ECIL.

Following, tests shall be performed on the system:

- Functional test on random 50% I/O's with real-time display/ control wherever possible or by software simulation.
- Functional verification of interlocks, alarm & control logic prototypes.
- Functional tests on PC's with SCADA software thereon (survey on display screens, trending, I/O address mapping).
- Network Test: All PLC panels shall be connected in Ethernet network & communication of I/O information shall be monitored.

6 Warranty & Support:

The party shall provide On-the-Site warranty on all supplied hardware as well as the software for (at least) 15- months from the date of supply.

Further, the party shall provide all time- to- time updates & upgrades on all relevant software & drivers for at least 15 years from date of supply, free-of-cost. Any upgrade required owing to up-gradation of OS shall also be covered.

7 Available Facilities:

- 7.1. PLC Stations equipped with all specified & associated hardware (as per 1.7 above), internally wired & with all field sensors from plant terminated, are available at BARC for development.
- 7.2. ECIL make ECLogic9 Programming Software for MPROGICON series PLC (Part/

Model No.: ECPU9W) installed in 2 nos. of business-workstations is available at control room for development & testing.

7.3. ECIL make HMI Server Software- Runtime/ Development (Part/ Model No.: ECSCADA-V7.0) installed in 2 nos. of business-workstations is available at control room for development & testing.

7.4. ECIL make HMI Client Software- Runtime/ Development (Part/ Model No.: ECSCADA-V7.0) installed in 8 nos. of IPC's of PLC Stations are available at various locations in the plant for development & testing.

7.5. Laying of 50/ 125 μ m x 2- core, 35 meter fibre-optic redundant cable links (2 nos.) at site shall be carried out by BARC.

8 Due Date: **16/ 02/ 2022**

The party shall send their quotation by post only. Further, the quotation must reach us [on or before the due date](#), positively. Quotations received after the deadline shall be marked "Late" and shall not be considered.

9 Desired Information:

Please furnish the following information in your quotation.

Technical – Bid:

9.1. Point-wise compliance report against our desired-specifications.

9.2. Deviations & Exclusions, if any, shall be clearly & honestly indicated.

9.3. Special & Additional Features etc. offered, if any, shall also be mentioned.

9.4. There shall be no mention of any commercial information in the technical bid. ([i.e. no pricing, no taxation details, no payment terms etc. to be mentioned in technical bid at all.](#))

9.5. Company-profile, Strengths, Experience details. ([in 1 or 2 pages only.](#))

9.6. Details of Manufacturing & Test-Facilities available.

9.7. List of similar jobs successfully completed or in hand, during the last 5 years. ([There is no need to attach copies of work/ purchase-orders; only a list mentioning PO/ WO numbers, job's short description, date/ year, order value & clients shall suffice.](#))

Price – Bid:

9.8. Price of the panel complete with and complete with all the specified switchgear, devices, indications, wiring etc.

- 9.9. Item-wise price breakup for the spares & panel accessories to be supplied, shall be positively included in the price bid. (no lump-sum pricing for spares & accessories.)
- 9.10. Total cost for the whole job.
- 9.11. Taxes as applicable. (tax component to be indicated separately.)
- 9.12. Payment Terms.
- 9.13. Validity of offer.
- 9.14. Completion period with Warranty.
- 9.15. PAN & GST Nos.


10 Dispatch of the Bids:

- 10.1. The Quotations shall consist of 2 – SEPARATE – SEALED – ENVELOPES, one containing “Technical – bid” & the other containing “Price – bid”.
- 10.2. Both the bids in sealed envelopes shall be placed in another SEALED – SINGLE – COVER.
- 10.3. The cover containing the bids shall be addressed to:

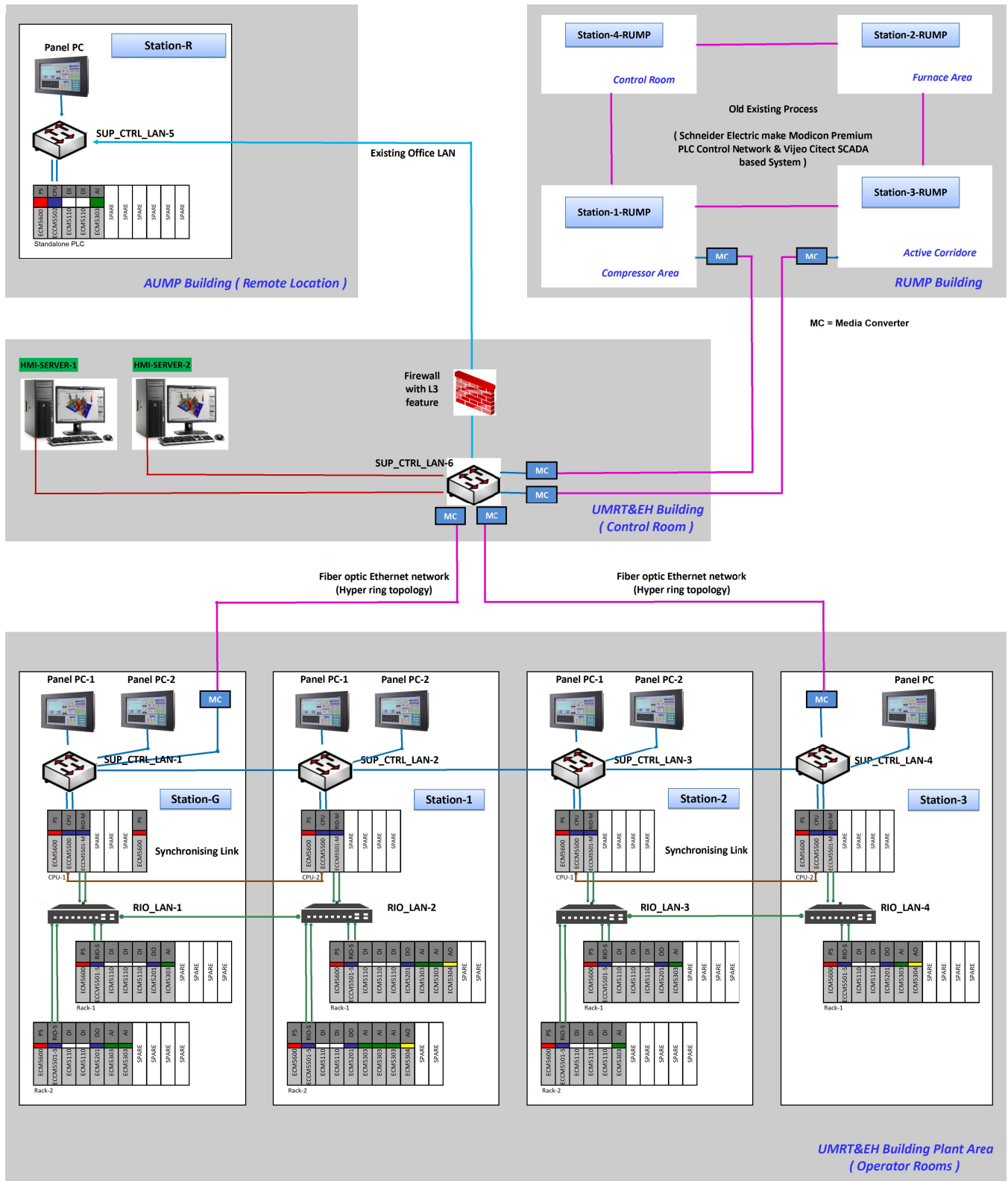
Head UED, BARC- Trombay, Mumbai- 400085.
- 10.4. Subject, Tender No., and Due Date, shall be written on all the envelopes & the cover containing the bids Without Fail.
- 10.5. Quotation shall be sent via INDIA / SPEED POST only. Quotations that are sent by courier or are hand delivered shall not be considered.

Thanking you.

Yours Sincerely,


25/01/2022
N. D. Hadap
Scientific Officer- F

Annexure- 1: PLC based Data Acquisition & Plant Monitoring System Architecture



N. D. Hadap
Scientific Officer- F

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