

เอกสารแนบท้ายเอกสารประกวดราคาอิเล็กทรอนิกส์

1.9 แบบฟอร์มตัวอย่างเอกสารแสดง

Table of Compliance

เอกสารแสดง Table of Compliance

คำอธิบายการกรอกข้อมูลในตาราง Table of Compliance

ผู้ยื่นข้อเสนอต้องจัดส่งเอกสาร Table of Compliance ในรูปแบบของตาราง และต้องกรอกข้อมูลด้วยตัวพิมพ์เท่านั้น โดยจะต้องเปรียบเทียบรายละเอียดของอุปกรณ์และงานทั้งหมดที่เสนอตามข้อกำหนดและในเงื่อนไขเฉพาะงาน โดยที่ตาราง Table of Compliance จะต้องประกอบด้วยรายละเอียดช่องต่างๆ ดังนี้

- (1) สถานะของการยอมรับข้อกำหนด (Conformance Status) ให้ผู้ยื่นข้อเสนอกรอกรหัสใดรหัสหนึ่งในช่องนี้เพื่อแสดงว่าผู้เสนอราคายอมรับข้อกำหนดหรือไม่ ดังนี้
“C” หมายถึง สามารถทำได้ตาม (Conform) หรือ ดีกว่า (Enhance) ตามข้อกำหนด
“N” หมายถึง ไม่สามารถทำได้หรือทำได้ไม่สมบูรณ์ (Non-Conform) ตามข้อกำหนด
“A” หมายถึง สามารถทำได้โดยใช้วิธีอื่นที่แตกต่างจากข้อกำหนด
- (2) สถานะของการเป็นสินค้ามาตรฐาน (Standard Equipment Status) ในกรณีที่ผู้ยื่นข้อเสนอกรอกรหัส “C” ในช่องสถานการณยอมรับข้อกำหนดตาม (3) ข้างต้น ให้ผู้ยื่นข้อเสนอกรอกรหัสใดรหัสหนึ่งในช่องนี้เพื่อแสดงว่าการที่ผู้ยื่นข้อเสนอยอมรับข้อกำหนดนั้น ผู้ยื่นข้อเสนอได้เสนออุปกรณ์หรือระบบที่เป็นสินค้ามาตรฐานทั่วไปของผู้ผลิตหรือต้องมีการดัดแปลงหรือต้องมีการพัฒนาเพิ่มเติมดังนี้
“S” หมายถึง เสนออุปกรณ์หรือระบบที่เป็นสินค้ามาตรฐานทั่วไป (Standard Equipment) ของผู้ผลิต
“M” หมายถึง เสนออุปกรณ์หรือระบบที่เป็นสินค้ามาตรฐานที่ต้องมีการดัดแปลง (Modify) หรือต้องมีการพัฒนาเพิ่มเติม
- (3) การอ้างอิงไปยังเอกสารข้อเสนอด้านเทคนิค (Proposal Reference) การยอมรับข้อกำหนดของผู้ยื่นข้อเสนอจะต้องมีความสอดคล้องกับรายละเอียดของเอกสารข้อเสนอด้านเทคนิคโดยผู้ยื่นข้อเสนอจะต้องระบุในช่องนี้ให้ชัดเจนว่ารายละเอียดที่อธิบายเกี่ยวกับการยอมรับข้อกำหนดว่าอยู่ ณ ตำแหน่งใดในเอกสารข้อเสนอด้านเทคนิค โดยให้ระบุเฉพาะเลขอ้างอิง เช่น แฟ้มที่ บทที่ ส่วนที่ หน้าที่ และบรรทัดที่ เป็นต้น และนอกจากนี้ผู้ยื่นข้อเสนอจะต้องระบุเลขหัวข้อ หรือหัวข้อย่อยของข้อกำหนดไว้ในเอกสารข้อเสนอด้านเทคนิค ณ ตำแหน่งที่มีรายละเอียดอธิบายเกี่ยวกับการยอมรับข้อกำหนดนั้นอยู่
- (4) ในกรณีที่แคตตาล็อกของอุปกรณ์ มีรายละเอียดด้านเทคนิคต่างจากข้อกำหนดของการไฟฟ้าส่วนภูมิภาค แต่ผู้ยื่นข้อเสนอได้ระบุไว้ในตาราง Table of Compliance ผู้ยื่นข้อเสนอจะต้องอธิบายและชี้แจงให้ชัดเจน รวมทั้งแนบหนังสือยืนยันจากผู้ผลิตอุปกรณ์หรือระบบดังกล่าวมาในเอกสารข้อเสนอทางเทคนิคด้วยมิฉะนั้นการไฟฟ้าส่วนภูมิภาคจะถือว่าอุปกรณ์หรือระบบที่เสนอมิคุณสมบัติไม่ตรงตามข้อกำหนดของการไฟฟ้าส่วนภูมิภาค
- (5) ในเอกสาร Table of Compliance หากมีรายละเอียดใดที่เห็นว่าเป็นส่วนสำคัญแตกต่างหรือดีกว่าข้อกำหนดของการไฟฟ้าส่วนภูมิภาค ผู้ยื่นเสนอราคาจะต้องอธิบายพร้อมเปรียบเทียบข้อดี-ข้อเสีย ให้เข้าใจชัดเจน
- (6) หากรายละเอียดข้อใดเป็นรายละเอียดในช่วงดำเนินงานหลังจากได้ผู้รับจ้าง หรือการทดสอบ FAT ให้ระบุชี้แจงให้ชัดเจน หรือบางหัวข้อไม่สามารถกรอกรายละเอียดอ้างอิงให้ผู้ยื่นเสนอราคาแนบหนังสือชี้แจงรับรองการทำงานของอุปกรณ์ได้

Table of Compliance

ประกวดราคาเลขที่: PAT-ADS-FDCU-1/2021

ผู้ยื่นข้อเสนอ:



FRTU Technical Specifications

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
1	Common Requirements				
1.3	Service Conditions				
	1) Temperature: 0°C to 70°C (IEC 60068-2-1, 2, 3, and 14, or equivalent)				
	2) Temperature Gradient: Up to 30°C(IEC 60068-2-1, 2, 3, and 14, or equivalent)				
	3) Relative Humidity: Up to 95% at 40°C (IEC 60068-2-30 and 38, or equivalent)				
	4) Cyclic Damp Heat: 40°C to 25°C at 95% Relative Humidity (IEC 60068-2-30 and 38, or equivalent)				
	5) Absolute Humidity: Up to 29g/m3 (IEC 60068-2-30 and 38, or equivalent)				
	6) Vibration (sinusoidal): 2g acceleration, 9 to 350Hz (IEC 60068-2-6, or equivalent)				
	7) Shock: 15g, 11ms test (IEC 60068-2-27, or equivalent)				
	8) Tilted Pole: Up to 10 degrees from vertical in any direction				
	9) Altitude:Up to 1,000 meters.				
1.4	Fail Safe Design				
1.5	Maintainability				
1.6	Immunity to Electrical Stress and Disturbance				
1.6.1	Minimum Insulation of Equipment				
	Rated Insulation Voltage: 500V (IEC 60255-5 Table I)				
	Dielectric Test Voltage: 2.0kVrms (IEC 60255-5 Table I Series B (Clause 6))				
	Insulation Resistance Test (IEC 60255-5(Clause 7))				
	Impulse Voltage Test: 5kV 1.2/50µs 0.5J (IEC 60255-5 (Clause 8))				

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
1.6.2	Immunity from EMI, Radiated Disturbance, and Electrostatic Discharge				
	High Voltage Impulse: 5 kV, 0.5 J (IEC 60060-1)				
	Electrical Disturbances (1 MHz Burst), CM 2.5 kV, DM 1 kV (IEC 60255-22-1,class 3)				
	Electrostatic Discharge Immunity IEC 61000-4-2)				
	Air: 8kV (Level 3)				
	Direct: 8kV (Level 4)				
	Radiated Immunity: 80 MHz-1 GHz (IEC 61000-4-3) (Level 3)				
	Fast Transient/Burst Immunity: 4 kV (IEC 61000-4-4, IEC 60255-22-4, ANSI/IEEE C37.90.1) (Level 3) (Class 4)				
	Surge Immunity: 2 kV/4 kV (IEC 61000-4-5) (Level 4)				
	Conducted Immunity: 10 V (IEC 61000-4-6)				
	Harmonics Emissions (IEC 61000-4-7)				
	Power Frequency Magnetic Field Immunity: 30 A/m (IEC 61000-4-8)				
	Pulse Magnetic Field: 1000 A/m (IEC 61000-4-9)				
	Damped Oscillatory Magnetic Field Immunity: 30 A/m (IEC 61000-4-10)				
	Oscillatory Transient Immunity (IEC 61000-4-12)				
	Ring Wave: 2.0 kV CM (Level 3)				
	Damped Oscillatory: 2.0 kV CM (Level 3)				
2	FRTU Functional Requirements				
2.1	TDMS Interface				
	1) Support two-way communications at least four Front-End Processors (FEPs) which have specific IP Address for each of FEPs.				
	2) Support communicate with the FEPs at data centers using the secure authentication of the DNP 3.0 protocol over IP.				
	3) Possible for the data to be sent under the following DNP 3.0 defined modes of operation:				

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
	3.1) During a Class 0, 1, 2, and/or 3 poll by the TDMS. This shall include: <ul style="list-style-type: none"> a) Integrity and report by exception polling. b) Sending selected status or analog points on demand. 				
	3.2) During an unsolicited (spontaneous) Class 1, 2, and/or 3 FRTU response to a power system event. This shall include sending an analog or status point value in the <ul style="list-style-type: none"> a) An analog value exceeds an individually configurable dead band around its previously reported value. b) An analog value exceeds an individually configurable Threshold. c) A status point changes state. 				
2.2	Input/Output Points				
2.2.1	Analog Inputs				
	1) Acquire analog inputs directly without transducers from each of three power system voltage and current terminals in the existing or Contactor-provided RCS control cabinets.				
	2) Apply suitable filtering to eliminate the risk of signal aliasing.				
	3) Use voltage and current inputs for calculations that support TDMS acquisition of the following data as a minimum: <ul style="list-style-type: none"> a) Line-to-line voltages. b) Phase current magnitudes and phase angles. c) Real and reactive powers (three-phase kW and kVar totals with sign) d) Power factor. 				
	4) Accept ac voltage input signals with a normal input level of 110 V.				
	5) Employ analog to digital converters with minimum of 16-bit resolution for a bipolar input signal.				
	6) Accurately resolve ac voltage input signal levels from 0 to 150 V.				
	7) Accurately resolve ac current input signals with normal ranges of 0 to 5 A or 0 to 1 A.				

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
	8) Include the capability to report all analog values that have changed by more than their programmable dead bands from their last values successfully reported to the TDMS.				
	9) Record maximum rms fault current signals, over a period of at least one (1) second, up to 20 times normal (100 A) within a maximum error of 2.5% of Full Scale Deflection (FSD).				
	10) Not impose a total analog input burden of more than 0.5 VA for all current and voltage inputs.				
	11) Demonstrate an overall analog input error of no more than $\pm 0.2\%$ of 1.2 times normal FSD over the temperature range 0 to 70 °C.				
	12) Demonstrate an analog input linearity better than $\pm 0.05\%$.				
	13) Reject common mode ac (50 Hz) voltages up to 150 V.				
2.2.2	Status Inputs				
	1) All necessary wetting voltage, current limiting, input isolation, and bounce filtering shall be provided.				
	2) Contact de-bounce time periods shall be individually configurable.				
	3) The input circuits shall be optically isolated from the external signal.				
	4) Unless the FRTU can provide its own self-supplied wetting voltages, input contact wetting voltages shall be 24 Vdc as obtained from the dc power supply in the existing or Contactor-provided RCS control cabinets.				
	5) Each wetting voltage circuit shall be protected with its own circuit breaker				
2.2.3	Control Outputs				
	1) A Select-CheckBack-Before-Operate (SCBO) procedure for all control operations.				
	2) RCS opening and closing by sending commands to a complimentary pair of contact outputs				

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
	3) Momentary control where each output provides a contact closure pulse having an individually programmable duration from 1 to 60 seconds in increments of 1 second				
2.2.4	Feeder Fault Current Detection				
	1) Overcurrent (ANSI 50/51, 50G/51G)				
	2) Sensitive earth fault (ANSI 50SEF)				
	3) Directional relay (ANSI 67)				
	4) Broken conductor (ANSI 46BC or ANSI 47BC)				
	5) Negative sequence voltage (ANSI 47)				
	6) Report Fault Event, Fault Direction, and Fault Clearance Event details as time-stamped Sequence of Events (SOEs).				
	7) Save the last 128 Fault Events along with their corresponding Fault Direction and associated Fault Clearance Event details and, on demand, report them to the TDMS.				
	8) Support a configurable format for local fault record reporting including the Comma Separated Variable (CSV) format for use in a spreadsheet and the COMTRADE (IEEE C37.111-1999) format for use with a commercial COMTRADE viewer.				
2.3	FRTU Architecture				
2.3.1	Central Processing Module				
	1) Support a high-level language processing capability per the open IEC-61131-3 standard for programmable logic controllers.				
	2) Support management of the FRTU database from a local test set including the DAC Simulator.				
	3) Support download and upload of FRTU parameters and configuration data.				
	4) Implement the DNP 3.0 Secure Authentication protocol interface with the TDMS.				
	5) Control data acquisition from the RCS and the sending of control commands to the RCS using an I/O module.				
2.3.2	I/O Module				

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
	1) Capability to accept analog and status inputs and send control outputs. This shall include fault current measurements.				
	2) Capability of being replaced without reprogramming, redefinition of configuration parameters, or rewiring.				
2.3.3	Communications Interface				
	1) Remote data communications with external systems and devices over an Ethernet/IP network using the secure authentication of the DNP 3.0 protocol over IP.				
	2) Local and remote configuration with a static IP address.				
	3) The fully implemented message security features of the DNP 3.0 protocol running over TCP/IP. This capability shall be demonstrated successfully as part of factory acceptance testing.				
	4) Features such as HTTPS for web server functionality (refer to Clause 2.3.5).				
	5) Blocking or disabling of ports to prevent unauthorized access.				
2.3.4	Time and Date Function				
	1) Include an internal time-of-day clock for data collection coordination. The time resolution of the internal clock shall be one (1) ms or better and, without synchronization, the time shall drift by no more than 5 ms per hour.				
	2) Be able to receive a DNP 3.0 compliant time and date message that contains a Greenwich Mean Time (GMT) reference signal, generated by the TDMS in long format and in such a way as to properly account for communication path delays.				

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
	3) Be able to synchronize the internal clock to the GMT time and date received from the TDMS.				
	4) Be able to synchronize to an optional Global Positioning System (GPS) receiver. The receiver shall be used to synchronize the internal clock to the correct GMT time and date within a time resolution of at least 1 millisecond.				
2.3.5	Web Server Function				
	1) Maintenance features that include the capability to upgrade and configure FRTU				
	2) The capability to set FRTU communication parameters such as DNP3 Source Address, Destination Address, Timeouts, Retries, Frame Size, etc.				
	3) The capability to set FRTU clock time, time synchronization, and fault detection features.				
	4) Display and clearance of historical logs and the capability to export logs in CSV format.				
	5) MMI features such as mimic and graphic displays supporting for example RCS monitoring and control, visualization of site location details, and presentation of voltage and current measurements.				
2.4	Software/Firmware				
2.4.1	Operating System				
	1) Be a real-time non-proprietary operating system.				
	2) Manage and support all FRTU applications.				
	3) Support editing and customization by the Authority as needed to maintain FRTU operation.				
	4) Provide automatic restarts of the FRTU on power restoration, memory parity errors, hardware failures, and manual request.				
	5) Initialize the FRTU on power-up and begin execution of the FRTU functions without intervention by the TDMS.				
	6) Report all restarts to the TDMS.				

Clause No.	Clause Name	Conformance Status (C,A or N)	Standard Equipment Status (S or M)	Proposed of Data	Referred to Page
2.4.2	Operating Software				
	1) Prepared in a high-level language such as the IEC61131 programming suite.				
	2) Free of additional licensing charges or license agreements.				
	3) Supported by protocol, configuration, and application data contained in easily programmable non-volatile memory such as Flash EPROM.				
2.4.3	Diagnostic Software				
	1) Continuously monitor operation of the FRTU.				
	2) Report FRTU hardware errors to the TDMS.				
	3) Check for memory, processor, and input/output errors and failures.				
	4) Be sufficiently detailed to detect malfunctions to the level of the smallest replaceable component.				
	5) Facilitate isolation and correction of all failures.				
	6) Include features promoting rapid fault isolation and component replacement.				
	7) Include integrated on-line diagnostic functions in all functional module nodes.				
	8) Report diagnostic results to the CPM for store and forward to the TDMS.				
2.5	Interlocking				
	1) Configurable interlock logic to prevent misoperation of the RCS.				
	2) The interlock information shall be sent to the TDMS via the DNP 3.0 protocol.				

Table of Compliance for Cellular Router

Bid No: PAT-ADS-FDCU-1/2021

Specification No: RMIS 102-2559 and Addendum

Technical Specification of : Cellular Equipment for field devices Interface (Cellular Router)

Manufacturer :

Brand/Model/Product :

Sub Model /Series : -

Bidder :

Item	Details	Requirement	Statement of Compliance	Proposal Data	Remark
			C / N		
2.1	<u>Cellular Router</u> ,	industrial grade, suitable for connecting with field devices such as Remote Controlled Switches (RCS), reclosers, etc. for SCADA communication via cellular network, with :			
	Electromagnetic compatibility (EMC) standards compliance :	- IEC/EN 61000-4-3 level 3, or better - IEC/EN 61000-4-4 level 3, or better - IEC/EN 61000-4-5 level 3, or better - IEC/EN 61000-4-6 level 3, or better - IEC/EN 61000-4-12 level 3, or better			
	Cellular technology :	3G and 4G, or more			
	Frequency bands :	Frequency supporting 3G and 4G, or more allowed by The National Broadcasting and Telecommunications Commission (NBTC)			
	Maximum output power :	according to Thailand's telecommunication standards and regulations and approval certificate from NBTC shall be submitted			
	Protocol support :	UDP, TCP, IP, PPP and Telnet, or more			

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Item	Details	Requirement	Statement of Compliance	Proposal Data	Remark
			C / N		
	Functions, features and securities :	- automatic connection			
		- transparent (for TCP client/server and UDP protocol for serial interface)			
		- keep alive			
		- Network Address Translation (NAT), port forwarding, intrusion protection, filtering and Access Control List (ACL) or equivalent function			
		- or more			
	SIM card interface :	1 x SIM card holders, or more			
	Communication interface:	- Ethernet port (RJ-45), with:			
		- number of ports : not less than 1 port			
		- baud rate : 10/100 Mbps, or better			
		- protection : not less than 1.5 kV Electro Static Discharge (ESD) protection			
		- RS-232, with:			
		- number of ports : not less than 1 port			
		- baud rate : 1,200 bps – 115,200 bps, or better			
		- data format : 8 bits, 1 stop bit, None/Odd/Even parity			
	- protection : not less than 6 kV Electro Static Discharge (ESD) protection				
	External antenna interface :	SMA female, or other interface connectors provided with adaptor			

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Item	Details	Requirement	Statement of Compliance	Proposal Data	Remark
			C / N		
	Mounting :	wall mounted or standard DIN rail mounted			
	Signal strength and status indicators :	LED indicators			
	Degree of protection :	IP 20, or better			
	Operating temperature :	up to 70°C			
	Operating relative humidity :	up to 90% non-condensing			
	Nominal power supply voltage :	12 V DC and 24 V DC, or better			
	Complete with:	1. One (1) set of communication cable, not less than 1 meter length, with connectors for connecting the Router to the field device via Ethernet port.			
		2. One (1) set of communication cable, not less than 1 meter length, with connectors for connecting the Router to the field device via RS-232 port.			
		3. One (1) set of communication cable, not less than 1 meter length, with connector (SMA male to SMA female) for connecting the Router via external antenna interface to surge arrester.			
		4. Power supply cord			
		5. Mounting kit			
		6. Software for router and Telnet configuration with Graphic User Interface (GUI) and instruction manual			
		7. Other accessories according to manufacturer's design and auxiliary equipments necessary to complete.			

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Item	Details	Requirement	Statement of Compliance	Proposal Data	Remark
			C / N		
2.2	<u>Surge arrester</u>	gas discharge type, suitable for protection the Cellular Router form a external surge by series connection, with:			
	Working frequency range :	DC to 3 GHz, or better			
	DC breakdown voltage :	not less than 90 V DC			
	Voltage protection level :	not more than 700 V			
	Maximum discharge current :	not less than 10 kA			
	Voltage Standing Wave Ratio (VSWR) :	not more than 1.5:1			
	Insertion loss :	not more than 0.9 dB			
	Interface :	SMA male (Modem/Router side) to SMA female (Antenna side) or other interface connectors provided with adaptor			
	Operating relative humidity :	up to 90% non-condensing			
	Complete with:	1. Instruction manual			
2. Other accessories according to manufacturer's design and auxiliary equipments necessary to complete.					

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Item	Details	Requirement	Statement of Compliance	Proposal Data	Remark
			C / N		
2.3	Antenna	omni directional and outdoor application, suitable for using with Cellular Router, with:			
	Polarization type :	vertical			
	Gain :	not less than 3 dBi			
	Frequency :	Frequency supporting 3G and 4G, or more allowed by The National Broadcasting and Telecommunications Commission (NBTC)			
	Voltage Standing Wave Ratio (VSWR) :	not more than 2.0:1			
	Material :	waterproof fiberglass			
	Complete with:	1. Antenna mounting, suitable for installation the antenna on the top of the existing field device's control cabinet or beside of the concrete pole.			
		2. One (1) set of communication cable, not less than 1 meter length, with connector for connecting the antenna to surge arrester. The antenna interface of the arrester is SMA female.			
3. Instruction manual					
4. Other accessories according to manufacturer's design and auxiliary equipments necessary to complete.					