



**SOFTWARE AND HARDWARE SPECIFICATIONS FOR  
SMART METERING SYSTEM (HEAD-END  
SYSTEM)**

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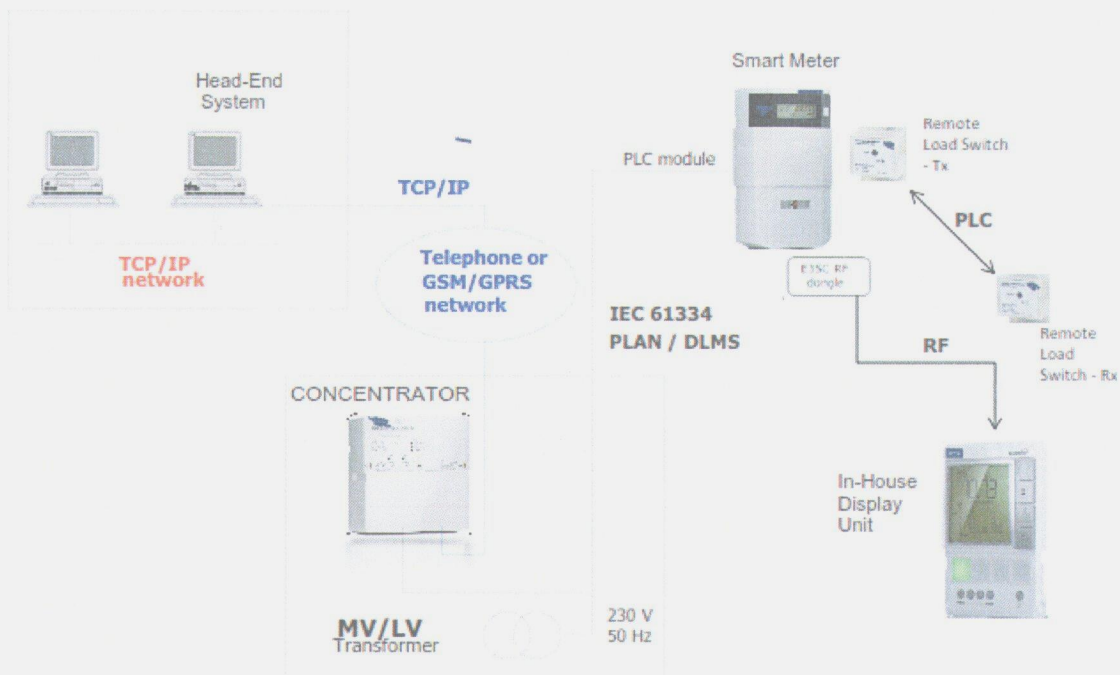
**REVISION RECORD**

REVISION	DESCRIPTION OF REVISION	DATE
1 <sup>st</sup>	1 <sup>st</sup> Issue	August 2013
2 <sup>nd</sup>	2 <sup>nd</sup> Issue	March 2014

**KENYA POWER  
SMART METERING TECHNICAL COMMITTEE  
(SOFTWARE REQUIREMENTS)**

1. The following are the minimum SOFTWARE SPECIFICATION REQUIREMENTS for the proposed SMART METERING system to be employed. Prospective Bidders must clearly expound on the specifications required below.
2. Any assumption or contingency due to claimed unclear or incomplete specifications should be described in detail and included in the bid.
3. Where the specification is not met, indicate clearly NOT AVAILABLE.

## SMART METERING SYSTEM



## A. General Requirements

### 1. General Requirements:

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference</b>
The system should meet the ISO 9000, ISO 9001-2008 Quality Assurance certification or similar.		
The system should employ an "Open System" policy/architecture that promotes interoperability between third party hardware and software to allow for future development, modification and enhancement.		
The system shall have a user friendly, web-based dashboard application		
The system should be scalable to cater for future growth.		
The system should be developed using the latest technologies (software and hardware).		
The technologies should be supported by reputable companies/organizations with proven track records.		
The bidder is fully responsible for the delivery of all deliverables (application software, documentation, training, support etc).		
The licensing structure of the software should be clearly indicated together with the cost, where software license applies.		

## 2. Manufacturer/Bidder Related Requirements

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference</b>
The bidder should clearly demonstrate and assure that the technologies used are sustainable for years to come.		
The bidder shall state the licensing structure for the software system(s) and the hardware thus delivered.		
The bidder should provide continuous software and hardware upgrades, support and consultancy to cater for changing functional and technical business requirements.		

## 3. Languages Supported

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference</b>
ALL the Hardware and Software manuals and documentations should be in English Language.		
ALL the manuals and documents shall be delivered in CD ROM format and a hard copy for each manual/document.		

## 4. References of Successful Implementation

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference</b>
The system should have been successfully implemented at large installations in Africa similar to KENYA POWER		

## B. Functional Requirements

### 5. System Structure & Design

KENYA POWER minimum requirements	Bidder's Remark/Compliance	Reference
The systems and solutions provided by the bidder are expected to be of the latest versions.		
The system should provide a <b>web-based</b> user-friendly GUI environment for daily/routine usage of the system.		
The procedure for managing bulk or batch processing should employ user friendly GUI and be efficient in terms of time and resources.		
All system inputs MUST be subjected to validation checks and audit trails.		
SMART METERING should be visible to front office staff to enable speedy resolution of customer complaints		
The system should provide a user-friendly environment for making changes to programs, settings, interfaces and customisation. The environment must provide useful information to the user such as warning, alerts and error messages where applicable.		
It shall be possible to disconnect and reconnect the Smart Meter remotely		
It shall be possible to control the remote load control devices connected to the meter via the home area network		
It shall be possible to change messages to the In-house display unit from the Head-End system		
It shall be possible to send revised Time of Use Tariff online		
It shall be possible to carryout demand side management		
The system shall be capable of giving energy balance information		
The supplier must demonstrate interoperability with other devices. A copy of the relevant certificate shall be submitted with the tender document.		<del>Clarify with Tom</del>

KENYA POWER minimum requirements	Bidder's Remark/Compliance	Reference
The system shall provide visualized information on: Data availability PLC communication quality GPRS communication quality Smart Meter status Service Status		
The system shall come with a mobile interface communication portal		
The system shall have capacity to accommodate a minimum of 250,000 meters.		
The system shall have capacity to support Smart Grid Technology.		

## 6. Main System Components

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
Meter: <ul style="list-style-type: none"> <li>As specified in the meter specifications</li> </ul>		
Meter Software: <ul style="list-style-type: none"> <li>Capture readings on all scales of the meter</li> <li>Communicate alerts and events on the meter including tampering, loss of power etc.</li> </ul>		
Information management: <ul style="list-style-type: none"> <li>Data acquisition for readings, events and alerts.</li> <li>Management and executive reports</li> <li>Data backups and archiving</li> </ul>		
Security Management: <ul style="list-style-type: none"> <li>Audit trails and Logs</li> <li>Replication management</li> <li>Disaster Recovery policy and procedure.</li> </ul>		

## 7. Information Processing

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The system <b>MUST</b> present the information in a format that will be interfaced to the current billing software; this <b>MUST</b> be in ODBC format or XML files.		

## 8. Reports

KENYA POWER minimum requirements	Bidder's Remark/Compliance	Reference:
The system should maintain a comprehensive history of information for purposes of generating reports, trends and performing data analysis.		
Active/online data shall be available in reports for a period of at least two years and historic data for seven years		
<p><b>The system MUST provide the following reports on a minimum:</b></p> <p><b>Meter Consumption</b></p> <ul style="list-style-type: none"> <li>a) Reports on all events recorded by the meter.</li> <li>b) Reports on all alerts generated by the meter.</li> <li>c) Meter reading and load profile data.</li> <li>d) Exception reports</li> <li>e) Periodic (daily/monthly/yearly) consumptions reports.</li> </ul>		
Outage Management Reports		
<p><b>Other General Reports</b></p> <ul style="list-style-type: none"> <li>a) Exception, Fraud and theft reports.</li> <li>b) Energy balancing report.</li> </ul>		
The system should provide flags and/or warning indicators.		



## C. Technical Requirements

### 9. Application Software – Development Platform

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The system must be implemented utilizing a relational database management package (RDBMS) supporting ODBC or XML formats and an industry standard fourth generation development language (4GL).		
The application should be developed under a systems development methodology and that all related documentation is up to date.		
Quality assurance methods (such as maintaining standard set of test data, use of regression test methods etc) should be used to monitor system changes.		
The system MUST be highly parameterised for ease of adapting to business and operational environments.		
Modification of source code must only be used to provide fundamental changes and additions to application system functionality.		

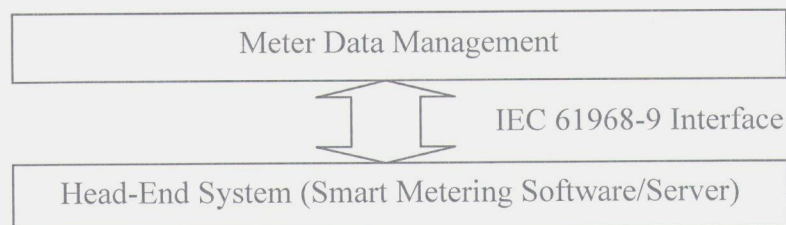
### 10. Operating Systems & Database

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The system should be capable of operating on the current KENYA POWER hardware environment of		

Solaris UNIX servers & Windows NT Servers.		
The Database should be scalable to cater for future growth.		
The system should support Database replication and mirroring technologies etc.		
All Database transactions MUST be subjected to integrity/validation checks and audit trails.		

## 11. Interface and Interoperability Support

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The system shall have a bus interface to other systems for the purpose of transferring meter information. The interface shall be as per IEC 61968-9 standard.		
The system shall have an interface to Kenya Power's Meter Data Management System (MDM). The interface shall be as per IEC 61968-9 standard. Refer to the diagram below:		
The system should have a flexible interface, import/export feature (report generator functionality), which can be easily modified by KENYA POWER staff.		
The system should support import/export data over ODBC compliant interfaces to other database systems.		



## 12. Computer Operating Procedures

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
Should an operating procedure be interrupted before completion, the application must be able to restore the system to it's original state and then re-run the procedure.		
The application should ensure a proper state of readiness before production procedures are allowed to begin. Co-ordination between events and availability of system resources should be provided i.e. all necessary resources should be available before a process executes.		

## D. Security Requirements

### 13. General Descriptions

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The system MUST support an integral fraud management facility that provides comprehensive procedures and/or measures for detecting, controlling and managing anomalies and exceptions such as electricity theft, fraud, tampering etc		
The system should provide a health and usage monitoring device to monitor system hardware, database and software configuration. This application system should schedule maintenance on the database and accompanying systems peripherals.		
The system should provide a contingency plan for handling any breach to security.		
The system should provide information on customer usage patterns for use in report preparations, analysis and detection of fraudulent trends.		
The system should facilitate identification of theft of electricity (e.g. if electricity consumption has dropped dramatically over a longer period).		

### 14. Application Level Security

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The Application system must include a computer operation audit trails to verify times,		

files used, types and purposes of batch jobs, on-line enquiries, information flows and the logging of user sessions.		
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## 15. Database Security

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
At the database level the system must provide for the journaling (logging) of all events.		
The application Database must be protected from tampering and computer fraud (e.g. using Encryption etc)		
The application MUST protect the system data and programmes from tampering and computer theft		

## 16. Audit and Controls

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The system should provide an elaborate audit trail with a security mechanism to determine access to the various transactions.		

## 17. Data Management (Backup/Integrity)

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The system should have an elaborate procedure for taking backups, archiving and data recovery. Clearly state the Disaster Recovery policy		

and procedure employed.		
The Application system, through operating system facilities, should use a system file catalogue to eliminate the need to know where files are placed.		
The application system should be designed for automated archiving of disk and files to removable media based on parameters such as last used dates.		
The Application system should make use of library management facilities to properly catalogue, track, and secure all backed up data, e.g. it should not be possible to delete a required backup file.		
Full backup and contingency facilities must be available. Information restored from Backup files must produce identical results whether from full or incremental backups.		
All regular system activities, i.e. maintenance runs, on-line update/query and backup runs should be allowed to proceed concurrently.		
Backup and recovery services should be capable of ensuring data integrity regardless of what combinations of jobs are run		

## E. Implementation, Support & Maintenance Requirement

### 18. Implementation

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The bidder MUST provide a Project Management Schedule and road map to be adopted for the successful implementation of the system showing phases and expected milestones.		

### 19. Preparation for Delivery and Installation

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
Expert assistance will be required to assist with the following start-up activities: <ul style="list-style-type: none"><li>• Install and tune the application.</li><li>• Parameterise the application.</li><li>• Implement all ad hoc reports, changes and enhancements.</li></ul>		
The bidder should comply with the following requirements: <ul style="list-style-type: none"><li>a) Provide qualified staff to participate in all the specified activities.</li><li>b) Provide details of Bidder's staff (job description) and estimate the numbers of staff required to complete each activity.</li><li>c) Provide duration</li></ul>		

<p>required to do each job.</p> <p>d) Confirm that the implementation activities are correct and recommend any additional activities required.</p> <p>e) Provide a list of any additional project areas where the bidder can provide expertise.</p> <p>f) Provide list of products that will assist KENYA POWER in expediting and simplifying the installation and transition phases.</p>		
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## 20. Bidder Staff & Accreditation

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The bidder's staff MUST have adequate qualification and experience to implement and support the system.		
KENYA POWER will require the full participation of qualified Bidder staff during the installation and the transition phases.		
The bidder MUST provide the positions and duties required to implement, operate and support the system.		



## 21. KENYA POWER Staff Roles and KENYA POWER Staff Training

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
The bidder will provide training for 5 staff for at least 5 days during the factory acceptance testing. Other training will be carried out locally for the rest of the staff.		
The bidder will also provide the pre-requisite knowledge, skills and experience required by KENYA POWER staff to participate in this project in the various positions.		

## 22. Application Software Support

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
Help facilities must be available during business hours, i.e. between 8.00 am and 5.00 p.m., Kenyan time, on Monday to Friday of each week. All support must be provided via a single primary contact point.		
Support must cover the following areas: <ul style="list-style-type: none"> <li>• Help desk - required by end-users</li> <li>• Operations Support - required by computer operations staff.</li> <li>• Technical Support - required by developers and technical support Staff</li> </ul>		
It should be possible to arrange for call out support that is available during non-business hours and on a 24 hour, 7 days per week basis.		

## 23. Acceptance Testing

KENYA POWER minimum requirements	Bidder's Remark/Compliance	Reference:
<p>Prior to acceptance of deliveries a Provisional Application Acceptance Test (PAAT) of deliverables will be carried out at the manufacturer's site. A Final Systems Acceptance Test (FSAT) will be carried out after a complete implementation, and comprises all sites and the delivered hardware and software. These tests will require participation and assistance from the bidder.</p>		

## F. Training & Transfer of Knowledge Requirements

### 24. Training & Transfer of Knowledge

KENYA POWER minimum requirements	Bidder's Remark/Compliance	Reference:
<p>The bidder MUST provide comprehensive training to KENYA POWER staff for all technologies used.</p>		
<p>Training should cover the following areas on the minimum:</p> <ul style="list-style-type: none"> <li>• Functional: all the modules and functions of the system.</li> <li>• Technical: all aspects of hardware as well as software.</li> <li>• Implementation: the plans and processes required to successfully deploy the system.</li> <li>• Operational: all daily routines employed in running and managing</li> </ul>		

<p>the whole system successfully.</p> <ul style="list-style-type: none"> <li>• Support &amp; Maintenance: to enable KENYA POWER staff be able to troubleshoot, solve problems and keep the system running.</li> </ul>		
<p>The bidder should provide comprehensive training schedule detailing for each aspect of the project:</p> <ul style="list-style-type: none"> <li>• The minimal qualifications/prerequisites of KENYA POWER staff.</li> <li>• The number of staff required</li> <li>• The type of training to be offered.</li> </ul>		
<p>A detailed description of all training courses that will be required by KENYA POWER staff is required. For each training course, a complete course outline, prerequisites, duration, and target staff positions must be provided.</p>		

**/G. Documentation**

**25. Manuals**

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
<p>Extensive documentation and help facilities MUST be provided with the system. Both must be clear and concise.</p>		
<p>The following manuals MUST be provided:</p> <ul style="list-style-type: none"> <li>a) On-line User Guide</li> <li>b) Operational Procedures</li> <li>c) Application Training</li> </ul>		

d)	Manual Application Configuration Manual.		
e)	Technical Manuals: <ul style="list-style-type: none"> <li>• Application Data dictionary</li> <li>• Application Programming environment</li> <li>• Application Release installation instructions.</li> </ul>		
f)	Database Maintenance Manual		
g)	Customisation/Parameterisation documentation.		

## 26. Application Help

<b>KENYA POWER minimum requirements</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
Context sensitive Help is to be provided at the field, screen and function level and online documentation.		

## 27. IMPLEMENTATION PERIOD FOR PROJECT OF 3,000 SMART METERS

<b>Item</b>	<b>Bidder's Remark/Compliance</b>	<b>Reference:</b>
Mobilisation		
Central computer system		
Network infrastructure		
Site preparations		
Commissioning		
Installation of meters		
Others **		

## HARDWARE SPECIFICATIONS

### IT&T REQUIREMENTS FOR SMART METERING HEAD-END SYSTEM

This system will be responsible for collecting AMI data from the various meters end points via GSM/GPRS network and backhaul communication network to Corporate headquarters where the data will be processed before being integrated into KPLC MDMS and billing system. The four GPRS router will connect to a VPN concentrator viz Cisco 2811 router.

**TABLE 11: TECHNICAL SPECIFICATIONS FOR GPRS/EDGE ROUTERS**

<i>MINIMUM FEATURES REQUIRED</i>	<b>TENDERS OFFERS</b>
<i>MAKE:</i>	
GPRS/EDGE : <ul style="list-style-type: none"> <li>- FME connector for external antenna (50 ohm)</li> <li>- Antennas: External magnetic or right angle with device</li> <li>- Dual-band edge and GSM/GPRS engine that works on the four frequencies GSM GSM 900/1800.</li> <li>- GPRS data downlink/uplink transfer: max 85.6kbps</li> <li>- EDGE data downlink/uplink transfer: 236/118kbps</li> </ul>	
SERIAL INTERFACE <ul style="list-style-type: none"> <li>- DB25 V35 DTE</li> <li>- Speed: 300bps to 2mbps</li> </ul>	
LAN Interface <ul style="list-style-type: none"> <li>- 1 x 10/100-Base T, RJ 45,</li> <li>- Automatic detection</li> <li>- Managed switch (SNMP)</li> <li>- Ethernet IEEE 802.3</li> </ul>	
CONSOLE : RS-232 at 9600bps	
Power: 220/240vac, 50hz, British plugs	
SECURITY AND VPNS: <ul style="list-style-type: none"> <li>- IPsec encrypted: ESP and AH</li> <li>- IPsec in tunnel mode and in transport mode</li> <li>- Encryption algorithms: DES, 3DES</li> <li>- Password in the console, telnet</li> <li>- User and permission levels</li> <li>- ISAKMP configuration method</li> </ul>	
ENVIRONMENTAL SPECS: <ul style="list-style-type: none"> <li>- Temperature: 5 – 55 degrees centigrade</li> </ul>	

<ul style="list-style-type: none"> <li>- Humidity: 5% - 85%</li> <li>- Barometric pressure: 900 –1050 mbar</li> </ul>	
DIMENSIONS AND WEIGHT: bidder to specify	
MANAGEMENT: <ul style="list-style-type: none"> <li>- Command Line interface on console and telnet</li> <li>- SNMP:MIB-2</li> <li>- Events Logging System</li> <li>- Syslog client</li> <li>- Network Time Protocol (NTP)</li> </ul>	

**TABLE 12: TECHNICAL SPECIFICATIONS FOR THE CISCO 2811 ROUTER**

<i>MINIMUM FEATURES REQUIRED</i>	<b>TENDERS OFFERS</b>
<b><i>Router Chassis Features</i></b>	
Cisco 2811 chassis	
DRAM 128 MB	
Compact Flash 64 MB	
2 X 10/100 Fast-Ethernet ports on board	
2 on board AIM slots (1 internal AIM card installed)	
2 PVDM (DSP) slots on board (1 internal PVDM card installed)	
Integrated hardware-based encryption	
Support VPN hardware based encryption	
1 Console Port	
1 Auxiliary Port	
Cisco 2800 Advanced Security Software IOS	
<b><i>Required Interface Features for 2811 Router Type</i></b>	
4 x 1-port Serial WAN interface card (WIC-1T)	
1x 16-port 10/100 Ethernet switch interface card (HWIC-D-16ESW)	
10 x V35 Cisco cable DTE	
<b><i>Network Security Features</i></b>	
<input type="checkbox"/> Network Admissions Control	
Integrated hardware-based encryption	
Support VPN hardware based encryption	
Transparent Firewall	
<input type="checkbox"/> IPv6 Firewall	

<input type="checkbox"/> MPLS VPN support	
<input type="checkbox"/> Multilevel security on console access	
<input type="checkbox"/> TACACS and RADIUS authentication	
<b><i>Quality of Service</i></b>	
Support for Layer 3 QoS features and standards	
<b><i>Management</i></b>	
<input type="checkbox"/> SNMP monitors and controls	
SNMP and Telnet interface in-band management	
CLI management console	
<input type="checkbox"/> RMON software agent	
<input type="checkbox"/> Trivial File Transfer Protocol (TFTP)	
<input type="checkbox"/> Network Timing Protocol (NTP)	
<input type="checkbox"/> Multifunction LEDs for port status	
<b><i>Support for Cisco Works</i></b>	
<input type="checkbox"/> Support for Cisco Works network management software	
Cisco Discovery Protocol (CDP) & network topology.	
<input type="checkbox"/> RMON-MIB	
<input type="checkbox"/> SNMPv2-MIB	
<b><i>Connectors and Cabling</i></b>	
<input type="checkbox"/> 10/100 BaseT ports: RJ-45 connectors, CAT 5 unshielded twisted-pair (UTP) cabling	
DB60 Serial port: RS-V35 Cable, DTE, Male, 10 Feet	
<input type="checkbox"/> Management console port: 8-pin RJ-45 connector, RJ-45-to-DB9 or DB25 adapter cable for PC connections	
<b><i>Power Connectors</i></b>	
The internal power supply supports input voltages between 100 and 240 VAC.	
The supplied AC power is 3 pin British	
<b><i>Dimensions and Weight (H x W x D)</i></b>	
1 RU by 19-inch rack mount	
Length (to state)	
Width (to state)	
Weight (to state)	
<b><i>Environmental Ranges</i></b>	
<input type="checkbox"/> Operating temperature: 5 to 45°C	
Storage temperature: 5 to 70°C	

Operating relative humidity: 5–85% (non-condensing)	
Operating altitude: Up to 3000 m	
<b>Power Requirements</b>	
<input type="checkbox"/> Power consumption: to state	
<input type="checkbox"/> AC input voltage: 100 to 240 VAC (auto-ranging)	
AC input frequency: 50 Hz+- 10%	
<b>Electromagnetic Emissions Certifications</b>	
FCC Part 15 Class A	
<input type="checkbox"/> EN 55022: 1998 (CISPR 22) Class A	
<b>Warranty</b>	
Cisco Lifetime limited warranty	
1 year warranty support and maintenance	
Cisco Smart Net services	

**TABLE 13 SMART METER HEAD-END SERVER SPECIFICATIONS**

S/No.	BASIC SPECIFICATION	MANDATORY/MINIMUM REQUIREMENTS	TENDERER'S OFFER
1.	Form Factor	Blade Servers complete with a rack	
2.	AC Power	Dual Supply, 220 – 240V AC, 50Hz	
3.	Operating systems provided	Microsoft Windows 2003 Server, Enterprise Edition	
4.	Processor type	Dual core Intel xeon 5140 processor FSB with 4MB level 2 cache.	
5.	Memory (Installed Ram)	4GB PC2-5300 Fully buffered DIMMs memory pair	
6.	Storage Controller	Smart Array P400/512MB BBWC Controller (with RAID 0/1/5 support)	
7.	Internal Storage	Hot Plug Serial attached SCSI (SAS) 1.168TB	
8.	Hard Drive bays	8 drive bays (Serial attached SCSI (SAS) drives supported – SFF)	
9.	Hard Drive	72GB 10K HDD (RAID 5 ready ie at least three disks, plus 2 spares)	
10.	Optical Drive	DVD-ROM/DVD-RW	
11.	Expansion slots	Total of 8 (2 X 64bit/133MHz PCI-X and 6 X PCI – Express)	
12.	Input device type	Standard Keyboard, PS/2-2 button scroll mouse	
13.	Network interface	Embedded dual NC373i Multifunctional Gigabit Network adaptors with TCP/IP offload.	



S/No.	BASIC SPECIFICATION	MANDATORY/MINIMUM REQUIREMENTS	TENDERER'S OFFER
14.	USB ports	USB 2.0 support with six ports.	
15.	Display size	17" TFT	
16.	Color Support	256 bit resolution	
17.	Warranty	3 years	

**TABLE 14: BILL OF QUANTITIES**

Item	Description	Quantity
GPRS/EDGE routers	With 1 port V35, 1 port 01/100 Base T, GSM/GPRS SIM port	4
Cisco 2811 router	VPN service, 9-port Ethernet switch, 6 port WIC-T,	2
Cisco VPN server	Integrated in router 2811 above	2
AMI server	For AMI software	2

