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FOREWORD

This standard was prepared by the following work group members:

H. S. Somo Technology Services

The work group was appointed by the Distribution Study Committee, which, at the time of approval, comprised of the following members:

Sello Pokane	NIS
Rodney Mashashane	NIS
Ness Moabi	NIS
Osias Peleha	NIS
Siyabulela Mkhondweni	NIS

Recommendations for corrections, additions or deletions shall be addressed to the:

Innovation hub

City Power Johannesburg (MOE) Ltd

P O Box 38766

Booysens

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INTRODUCTION

City Power uses different communication mediums and platforms to cater for various business needs and applications. The network uses different software and hardware to ensure connectivity, facilitate communication and transmission of data. City Power requires the services of telecommunication system maintenance Service Providers to provide routine inspection, maintenance of systems to mitigate failure and repair damages.

1. SCOPE

This scope entails maintenance and repair of telecommunication systems within the City Power's communication network as well as upgrade of legacy equipment. The document outlines functions in relation to inspections, maintenance, commissioning and repairs of telecommunication systems. The document further establishes functional and performance requirements of planned maintenance and emergency repairs. The guidelines in this document shall be applicable to both City Power staff and the Service Providers.

2. NORMATIVE REFERENCES

The following standards and specifications contain guidelines requirements and references which will be followed by all the stakeholders in City Power Telecoms network. At the time of publication, the editions indicated were valid. All standards and specification are subject to revision and parties to agree based on this specification and are encouraged to investigate the possibility of applying the most recent editions of the standards and specification listed below.

IEC 61850, *Communication Networks and Systems in Substations.*

IEC 60870-6, *Telecommunication control Equipment and Systems.*

IEC 60529, *Degrees of Protection Provided by Enclosures (IP Code).4*

IEEE Std 525™, *IEEE Guide for the Design and Installation of Cable Systems in Substations.*

IEEE Std 1379™, *IEEE Recommended Practice for Data Communications between Intelligent Electronic Devices IED and Remote Terminal Units RTU's in a Substation.*

IEEE Std 1588™, *IEEE Precision Clock Synchronization Protocol for Networked Measurement and Control Systems.*

IEEE Std 1613™, *IEEE Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations.*

IEEE Std 1615™, *IEEE Recommended Practice for Network Communication in Electric Power Substations.*

IEEE Std 1646™, *IEEE Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation.*

IEEE Std C37.115™, *IEEE Standard Test Method for Use in the Evaluation of Message Communications between Intelligent Electronic Devices in Integrated Substation Protection, Control and Data Acquisition System.*

SANS 61850: *Communication Networks and Systems for power Utility Automation.*

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in the above documents shall apply to this specification.

3.1 Terms and Definitions

Accuracy:	The difference between the actual value of a measurement and the indicated value of the measurement.
Availability:	Availability (A) is defined in the following as the ratio of uptime to total time (uptime +downtime). It is customary to express availability in percentage, usually as 99.xxx, where xxx are numbers that complete the percentage.
Clear time:	The amount of time that the select relay shall continue to operate after the master trip or close has operated. Clear time can also mean operating time.
Control arm time-out:	The maximum amount of time that a device shall wait to receive an execute command after receiving a select or arm command. Refer to select command.
Diagnostics:	Programs executed to check the health of the device on either a periodic or random interval.
Latency:	The time between when sensor outputs are present at the physical interface of a measuring device until its value is available to the first user or program.
Local area network (LAN):	A LAN is a network normally designed for a limited geographical area, such as a utility substation or an office area. It is generally capable of transmitting data, voice, and image and video information.
Lock-out period:	A parameter that defines the length of time that a device or point shall be disabled from operation after exceeding a pre-defined error condition.
Modern:	(Modulator-Demodulator) – It converts digital signals generated by the computer into analogue signals which can be transmitted over a cable line and transforms incoming analogue signals into their digital equivalents.
Multiplexer (MUX):	A device that accepts multiple inputs of data but provides a single output.
Resolution:	The smallest increment of a value that can be resolved, often expressed as percent of full-scale. It is better expressed in engineering units of the measured value.
Unavailability:	The ratio downtime/ (uptime + downtime). The ratios of downtime to total time (uptime + downtime), or downtime/ (uptime + downtime). It is often expressed as a maximum period during which the variable is unavailable, e.g., 4 h per month.
Wide area network (WAN)	A WAN provides long-distance transmission of data, voice, and image and video information over a large geographical area. A WAN can be owned by a utility or WAN services can be leased from telecommunication providers. WANs connect LANs together.

3.2 Abbreviations

EMS	Energy Management System.
GUI	Graphical User Interface.
IEC	International Electro technical Commission.
I/O	Input / Output.
NIS	Network Infrastructure Support
ISO	International Standards Organization.
LAN	Local Area Network.
SHERQ	Safety Health Environment Risk and Quality
MTBF	Mean Time Between Failures.
MUX	Multiplexer
RTU	Remote Terminal Unit.
SABS	South African Bureau of Standards.
SC	Serial Cable.
SCADA	Supervisory Control and Data Acquisition.
OTDR	Optical Time Domain Reflectometer
PMLS	Power Meter Light Source
ICT	Information Communication Technology
ORHVS	Operations Regulation for High Voltage Systems
UPS	Uninterruptable Power Supply.

4. REQUIREMENTS

4.1 General requirements

4.1.1 The Service Provider's personnel on this contract shall have their own transport, tools, laptops, and all necessary testing equipment needed to carry out their duties.

4.1.2 Replaced components or accessories shall comply with the standards applicable when they were originally installed or with an alternative standard, or better than, the specified standard.

4.1.3 Replaced equipment used in the telecommunication networking system installation shall be certified as compliant with the relevant standards and approved by City Power.

4.1.4 All Service providers personnel must have a valid OHVRS certification.

4.1.5 Test equipment calibration certificates shall be provided by the Service provider.

5. DETAILS OF RESPONSIBILITIES

5.1 Service Providers Responsibilities

5.1.1 The maintenance duties shall include routine maintenance, fault finding, repair or replacement of the multiplexer, modern, fiber optic and pilot cables.
The service provider should test any replaced, refurbished or modified multiplexer/modern and telecommunication network equipment.

5.1.2 The service provider shall perform end-to-end testing on telecommunication equipment and connectivity functionality to remote station.

5.1.3 The service provider shall ensure optimal performance of telecommunication network circuits through planned and reactive maintenance by troubleshooting, repairing and replacing faulty equipment.

5.1.4 Provide technical support

5.1.5 Service providers shall be available 24 hours, 7 days a week for emergency services to attend to faults that may arise, also provide suitable standby plan for emergency teams.

5.1.6 The standby roster of their services personnel should be submitted monthly via Email to the Telecoms Systems Manager.

5.1.7 The Service Provider is expected to undertake emergency repairs to the Telecoms Systems. Some of these repairs shall be requested at short notice and may be required to be performed after normal working hours. These repairs shall be executed within reasonable time frames.

5.2 Routine Maintenance:

5.2.1 Routine Maintenance shall include but not limited to the following: Fault finding and repairs on Fiber optic cables and systems. Provide remedial for faults and update fault status.

5.2.2 Routine check of manholes and record their location.

5.2.3 Routine cleaning of fiber cores at the patch panel including Telecoms equipment.

5.2.4 Routine inspections on the fiber routes (aerial and underground installations).

5.2.5 Correct labeling of patch panels.

5.2.6 Routine inspection of pilot cable routes and termination cabinet.

5.2.7 Ensure networks availability following City Power standards.

5.3 Telecommunication equipment routine tests shall include the following:

5.3.1 Verify services by tracing, testing circuits and equipment.

5.3.2 Alarm conditions such as communications failure, power failure, etc., shall be checked. All alarms indication and discrepancies shall be corrected.

5.3.3 Diagnostic checks should be done to prevent equipment failures and outages.

5.3.4 Testing fibre of optical cables will be performed using two methods namely: PMLS and OTDR test. OTDR test shall be performed with a launch coil with a minimum of 100m.

5.3.5 Pilot cable testing will be performed using three methods, namely: Capacitance, Isolation and continuity tests.

5.3.6 Test results for routines shall be provided by Service provider as per agreed template with City Power.

5.4 ADHOC Maintenance

Maintenance and commissioning work shall include but not be limited to the following:

5.4.1 Supervision of works in copper and Fiber optic network ducts
5.4.2 Network elements troubleshooting and removal of threats at the access network
5.4.3 Visual and Physical inspection (Check all alarms & Hardware system testing) as per Telecoms tactic.
5.4.4 Fusion splicing.
5.4.5 Fiber cable terminations.
5.4.6 Civil works where required.
5.4.7 Ensure proper updates of network diagrams, labelling of equipment and cables, recording configuration diagrams and specifications.
5.4.8 Ensure that all installations have been properly tested and alarms correctly configured.
5.4.9 Maintains network by troubleshooting and repairing outages; testing network back-up procedures; updating documentation.
5.4.10 Maintains City Power rapport by listening to; resolving concerns; and answering questions
5.4.11 Repair and replacement of related equipment such as routers, modern, switches, multiplexors etc.,
5.4.12 Maintenance and repair of ducts.
5.4.13 Repair and replacement of aerial hardware and related accessories where necessary.
5.4.14 Repair and replacement of both aerial and underground installation.
5.4.15 Updating of drawings where any changes or modifications have been made.
5.4.16 Fault finding, repair and replacement of pilot cables.
5.4.17 Termination and jointing of pilot cable

5.5 Qualification and Access requirements.

5.5.1 Access to city Power's network shall be granted subject to a valid ORHVS certificate and City Power's System Operating Regulation. The ORHVS course shall be rendered by city power at the Service Providers' cost and the resource shall be issued with a certificate as proof of qualification.
5.5.2 The Service Provider shall have skilled and experienced resources with a National Diploma in Electrical Engineering (HC/LC) as a minimum qualification and a minimum of two years' experience in the telecommunications environment.
5.5.3 Service Providers shall not access or work on City Power's network without a valid city power Identification card. The standard Service Provider's responsibility form shall be signed to authorize and grant access.
5.5.4 The main or appointed Service Provider shall be responsible for its sub–Service Provider's resources as well as liable for any damages. The main Service Provider shall be penalized for outages and prolonged outages that result from the Service Provider negligence.

5.6 Service Providers Responsibilities

5.6.1 No work shall be carried out without proper authorization by City Power authorities as per City Power regulations.
5.6.2 City Power shall monitor the Service Provider's staff members performing work under this contract and decide where and when work is to be executed.
5.6.3 The tests agreed upon shall be witnessed by City power's authorized personnel.
5.6.4 City power shall only recognize names that were submitted with the tender document as qualifying and available to work on City power's network. Additional and replacement personnel shall not be permitted unless approved and authorized by City powers Network Infrastructure Support (NIS) management following a written application, with valid reasons, accompanied by the required supporting documents and the above-mentioned qualification criterion.

5.6.5 Equivalency certificates by an accredited organization shall be validated and approved by City Power's authorized personnel.

5.6.6 Resources shall be granted access by City Powers management when all the requirements stated in 5.6.4 have been met and the Service Provider should be penalized for the deployment of unrecognized and unapproved resources on City Power`s Network.

5.7 INCIDENT MANAGEMENT AND RESPONSE TIMES

Priority	Description	Condition
1	Critical	Total System Failure 50% (Port capacity) or higher System Failure, Primary timing source failure 2 Fiber 2 Mux 2 or more security links failure 1 or more ICT links failure 4 or more SCADA Channels
2	High	20% up to 49% (Port capacity) System Failure. 1 RTU circuit Failure Protection circuits Failure 1 IT link failure 1 security link failure 1 security link failure 2 or more ripple control links failure
3	Medium	< 5 Telephone circuit failure 1 ripple control link failure
4	Low	All other failures not included in Categories ABOVE
5	Configuration and Programming	Includes all configurations and minor ad hoc programming

Table1: Incident Management

Priority	Acknowledgement	Response Time	Commencement	Feedback	Maximum time to repair
1	½ HR	½ hr.	1 hr.	On site	4 hours
2	½ HR	1 hr.	2 hrs.	On site	5 hours
3	½ HR	2 hrs.	3 hrs.	On site	6 hours
4	½ HR	6 hrs.	8 hrs.	On site	12 hours
5	½ HR	2 hrs.	6 hrs.	On site	48 hours

Table2: Response Times

6. TRAINING

6.1 The Service Provider shall arrange training on services provided. The Service Provider shall clearly outline the layout of the recommended enhanced training and pricing per person.

6.2 The Service Provider shall also be required to provide training to City Power technical representatives on the system when enhanced features and functionality becomes available as the system is upgraded.

6.3 The suppliers shall provide technical support on system and equipment queries for the duration of the contract.

7. DOCUMENTATION

7.1 Technical product catalogue and operating manuals for all equipment shall be provided.

7.2 A copy of proposed maintenance schedules shall be provided.

7.3 The service provider shall make available all documentation for all equipment used and services rendered in both hard and soft copy.

7.4 The Service provider shall prepare Inspection; repairs and functional performance test report covering all information, data sheets, and a comprehensive summary describing any test. The test report shall be submitted to a City Power Responsible person.

7.5 In cases where the services of the 3rd party or Service Provider are used, the Service Provider shall supply copies of all test reports manually and electronically. Preference shall be given to computerized test reports submitted via email and with a hard copy issued later to NIS Telecommunication Maintenance.

7.6 Telecommunications – all test results for all repairs and installations.

8. QUALITY MANAGEMENT

A quality management system shall be set up to ensure Compliance of products and services. Guidance on the requirements for a quality management system shall be found in the following standards: ISO 9001:2015. The details shall be subject to the agreement between the City Power and supplier.

9. HEALTH AND SAFETY

A health and safety plan shall be set up to ensure proper management and compliance during installation, operation, maintenance, and decommissioning phases. Guidance on the requirements of a health and safety plan shall be found in ISO 45001:2018 standards. This is to ensure that the assets conform to standard operating procedures and City Power SHERQ Policy. The details shall be subject to the agreement between City Power and the Supplier.

10. ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up to ensure the proper environmental management and compliance. Guidance on the requirements for an environmental management system shall be found in ISO 14001:2015 standards. The details shall be subject to the agreement between City Power and the Supplier. These shall ensure that the asset created conforms to environmental standards and City Power SHERQ Policy.

ANNEX A - BIBLIOGRAPHY

None

ANNEX B - REVISION INFORMATION

DATE	REV. NO.	NOTES
APRIL	0	First issue
JUNE 2025	1	Second Issue
SEPTEMBER 2025	2	Second Issue (Revised)