

Annexure 1.1: Electronic Authorisation System

Contents

1	GENERAL	4
1.1	Purpose of the Document	4
1.2	Executive Overview	4
2	MINIMUM SYSTEM REQUIREMENTS	5
2.1	Electronic Authorisation System (“EAS”) Overview	5
2.2	Train Control System (“TCS”)	5
2.3	Electronic Authorisation Interlocking (“EAI”)	6
2.4	Operating Training Simulator	6
2.5	Technical Training Simulator	6
3	DEVELOPMENT AND VALIDATION	8
3.1	Development/Engineering Plan	8
3.2	EAS Development	8
3.3	Functional Product Validation	8
4	ENGINEERING	10
4.1	Design	10
4.2	VDU Configuration and Data Engineering	10
4.3	Manufacturing and Assembly	10
5	CONSTRUCTION	11
5.1	General	11
6	TESTING AND COMMISSIONING	12
6.1	General	12
6.2	Factory Acceptance Testing (“FAT”)	12
6.3	Site Acceptance Testing (“SAT”)	12
6.4	Final Testing and Commissioning	13
7	MAINTENANCE	15

	7.1	Overview	15
	7.2	First Level Maintenance	15
	7.3	Second Level Maintenance	15
	7.4	Third Level Maintenance	16
	7.5	Fourth Level Maintenance	16
8		WARRANTIES	18
	8.1	General	18

1 GENERAL

1.1 Purpose of the Document

- 1.1.1 The purpose of this document is to provide the Commercial and Financial Requirements (“CFR”) which form part of the minimum Requirements of the Passenger Rail Agency of South Africa (“PRASA”) for the planning, design, supply, construction, installation, testing, commissioning and maintenance of a new fully integrated, functional, complete and future-proofed PRASA Electronic Authorisation System (“EAS”) in PRASA’s Gauteng (“GP”), KwaZulu-Natal (“KZN”) and Western Cape (“WC”) service regions (“the Project”) that the Bidder shall meet and deliver at the Bidder’s cost therefore within the Bid Price for an Anticipated Minimum Period of 40 months (Consisting of 10 Months Implementation, 24 Months for a full Maintenance, Warranty and Defects Liability Period and 6 Months For Contract Close-Out Administrative Processes).

1.2 Executive Overview

- 1.2.1 Notwithstanding any other PRASA Requirements stated throughout the RFP, the Bidder shall uncompromisingly deliver the whole of the Works required to achieve successful delivery of the Project.
- 1.2.2 The EAS Component of the Works is, at a minimum, summarised as follows:
- a) Provide an EAS System that complies with the User Requirement Specifications (“URS”) for the PRASA EAS.
 - b) Provide associated CTCC and other Equipment such as computers, screens, etc. that is compatible with the EAS and which complies with the PRASA requirements and specification.
 - c) Configure the System for control of all PRASA railway lines according to the approved line plans and configuration data.
 - d) Provide all required resources to deliver and maintain the EAS Works.
 - e) Any other EAS Works, activities and resources required to achieve a fully integrated, functional, complete and future-proofed EAS and meet any other requirements and specifications as requested throughout the RFP or as otherwise instructed in writing by PRASA.

2 MINIMUM SYSTEM REQUIREMENTS

2.1 Electronic Authorisation System (“EAS”) Overview

2.1.1 The EAS shall, at a minimum, consist of the following elements:

- a) Train Control System (“TCS”).
- b) Electronic Authorisation Interlocking System.
- c) Operating training simulator.
- d) Technical training simulator.

2.2 Train Control System (“TCS”)

2.2.1 Traffic shall be remotely authorised from the Centralised Train Control Centre (“CTCC”) by means of the Man-Machine Interfaces (“MMI”).

2.2.2 The Train Control Officer (“TCO”) shall remotely authorise traffic and receive information back from the train driver by means of a communication System. The MMI shall display the state of the Network as per the information captured by the TCO.

2.2.3 The TCO workstations shall be scalable and it shall be possible to increase & decrease the area of control for each workstation depending on the workload requirements at a specific time.

2.2.4 It shall be possible to have several TCO workstations per control area, operate several control areas from a single TCO workstation as well as control any control area from any workstation.

2.2.5 The TCS shall be able to provide at least the following functions:

- a) Manual Train Control.
- b) Train number capturing and stepping.
- c) Data logging.
- d) Train monitoring.

2.2.6 The Bidder shall provide sufficient TCO workstations per Region to control at least 75% of the Network.

2.2.7 Each TCO workstation shall consist of at least six (6) 24” Visual Display Unit (“VDU”) monitors. The Bidder shall ensure ergonomic standards and best practices are met by designing and calculating the optimal number of VDU monitors for each workstation.

2.2.8 The Bidder shall provide at least one (1) Train Control Section Manager Workstation equipped with at least six (6) VDU monitors per CTCC. The workstation shall provide the Train Control Section Manager with a duplicate view of all TCO workstations.

2.2.9 The Successful Bidder shall provide at least one (1) Train Control Duty Manager Workstation equipped with at least six (6) VDU monitors per CTCC. The workstation shall provide the Train Control Duty Manager with a duplicate view of all TCO workstations, but shall not allow control.

- 2.2.10 The TCS shall interface with and transfer train number information to the adjacent TCS's at the CTC and/or adjacent CTC's. The adjacent TCS might consist of either:
- a) Siemens SATCOS System
 - b) Thales Aramis
 - c) CS90 VDU
 - d) CS90 VDU Warrant
 - e) Desk and Diagram
 - f) Other

2.3 Electronic Authorisation Interlocking (“EAI”)

- 2.3.1 The Successful Bidder shall provide a digital electronic authorisation interlockings.
- 2.3.2 Bidders shall clearly indicate which stations shall be grouped together and controlled by one EAI. One EAI controlling all control areas in a region shall not be acceptable
- 2.3.3 The EAI shall be a high integrity, failsafe System
- 2.3.4 The EAI shall be able to provide the functionalities described in the EAS URS.
- 2.3.5 The EAI shall be able to provide indications aligned with the SATCOS symbol catalogue. Additional indications shall be agreed on with PRASA and identical across all PRASA regions.

2.4 Operating Training Simulator

- 2.4.1 The Bidder shall provide an Operating Training simulator facility for each Region.
- 2.4.2 The facility shall include at least one TCO workstations, a Section Manager Workstation and an Instructor workstation.
- 2.4.3 It shall be possible to simulate all train control functions and train movements required for the successfully training of TCOs and Train Drivers.
- 2.4.4 The simulator shall react exactly as the actual System shall react to any TCO or System inputs.
- 2.4.5 The instructor workstation shall have the facility to place trains and System failures on any of the TCO workstations.

2.5 Technical Training Simulator

- 2.5.1 The Bidder shall provide a Technical Training simulator facility.
- 2.5.2 The facility shall include a complete integrated EAS System.
- 2.5.3 The facility shall include at least one physical Installation of all Equipment that forms part of the solution provided by the Bidder.
- 2.5.4 It shall be possible to simulate all System and Equipment failures identified as part of the FMECA.

- 2.5.5 The simulator shall react exactly as the actual System shall react to any System or Equipment failures or external input.

3 DEVELOPMENT AND VALIDATION

3.1 Development/Engineering Plan

- 3.1.1 The Bidder shall, as part of the Bid, submit a Development/Engineering Plan that covers all the activities, processes, methods and Tools to be put in place to ensure that the delivered EAS meets all its requirements. This plan shall mention the technical, references and sources used for the Design, Testing and Verification and Validation of the EAS and its integration in the PRASA context.
- 3.1.2 The Development/Engineering Plan shall cover the following aspects:
- a) Typical (Generic development) to customize the EAS implementation to the South-African Context and define the principles and Design rules to be applied to each subproject.
 - b) The adaptations of the EAS products to fit the South African context.
 - c) The production Engineering and the Testing (processes, activities and Tools) for the execution of the Project.
- 3.1.3 The Bidder shall be auditable by PRASA on establishment and effective implementation of processes and activities provided in the Development/Engineering Plan.
- 3.1.4 The Bidder shall review and upgrade the Development/Engineering Management Plan on request by PRASA and fully apply the approved Development/Engineering Management Plan.

3.2 EAS Development

- 3.2.1 The Bidder shall define the conceptual design for the implementation of an EAS customised for the PRASA Network and develop a generic application for PRASA.
- 3.2.2 The Bidder shall provide adapted products to fit the PRASA needs and necessary design and testing environment to start the rollout.

3.3 Functional Product Validation

- 3.3.1 The Bidder shall submit all relevant Validation certificates with detailed relevant documentation (Safety and Performance standards, etc.).
- 3.3.2 All EAS sub-Systems and Equipment shall have been, or shall be required to be, validated by PRASA's Independent Safety Assessor for compliance to the specified safety and functional requirements.
- 3.3.3 The Bidder shall submit all relevant System/Equipment designs, specifications and reports to PRASA for review and final acceptance by PRASA's Independent Safety Assessor.
- 3.3.4 The Bidder shall Design and implement a Validation model(s) at the Bidder's Project office, able to simulate all specified functional requirements for the purpose of Validation.

- 3.3.5 PRASA's Independent Safety Assessor shall validate and approve all EAS sub-Systems and Equipment prior to implementation.

4 ENGINEERING

4.1 Design

- 4.1.1 All designs shall comply with all relevant Standards, Specifications, Regulations and Procedures as specified throughout the RFP.
- 4.1.2 The Bidder shall submit the following designs and reports to PRASA for review and final approval by PRASA before implementation:
- a) EAS Mode Line plan.
 - b) Headway simulation report.
 - c) Control sheet.
 - d) Train Control Diagram and MMI layout
- 4.1.3 The Bidder shall submit the following designs and reports to PRASA for acceptance before implementation:
- a) Book of Circuits (BOC), containing at least the following information:
 - Revision history
 - Equipment room layout and earthing
 - Cabinet layouts
 - Circuit diagrams
 - Relevant typical circuits

4.2 VDU Configuration and Data Engineering

- 4.2.1 The Bidder shall do the VDU configuration using the approved Train Control Diagram.
- 4.2.2 PRASA to review and approve the VDU Configuration prior to Commissioning.
- 4.2.3 Data Engineering to be done and tested according to the approved Control Sheets

4.3 Manufacturing and Assembly

- 4.3.1 Manufacturing and assembly shall comply with all relevant Standards, Specifications, Regulations and Procedures as specified throughout the RFP
- 4.3.2 The Bidder shall submit a detailed Quality Management Plan ("QMP") for the Manufacturing and Assembly process to PRASA for acceptance.

5 CONSTRUCTION

5.1 General

- 5.1.1 EAS Construction work shall comply with all relevant Standards, Specifications, Regulations and Procedures as specified throughout the RFP.
- 5.1.2 EAS Construction work shall only be performed by PRASA approved signal companies.
- 5.1.3 The Bidder shall submit method statements for all EAS Construction work to be performed to PRASA for review and approval before commencement of the work.
- 5.1.4 The person(s) responsible for the construction shall not have been involved in any Design, manufacturing or assembling activities relating to the System, sub-System or Equipment.
- 5.1.5 The Bidder to perform all the Construction work, except if expressly stated otherwise in the GTRs or PTRs.

6 TESTING AND COMMISSIONING

6.1 General

- 6.1.1 All Testing and Commissioning activities to comply with all relevant Standards, Specifications, Regulations and Procedures as specified throughout the RFP.

6.2 Factory Acceptance Testing (“FAT”)

- 6.2.1 All relevant EAS Systems, sub-Systems and Equipment shall undergo and pass FAT before shipping to site.
- 6.2.2 The Bidder shall be responsible for all FAT.
- 6.2.3 All FAT shall be conducted at factory(s) at which the Plant and Materials are manufactured and assembled and by a railway Signalling Engineer or technologist, registered with the Engineering Council of South Africa (“ECSA”) as a professional Engineer or professional technologist and who has undergone training for the specific System, sub-System or Equipment and have experience in FAT.
- 6.2.4 The person(s) responsible for the FAT shall not have been involved in any Design, manufacturing or assembling activities relating to the System, sub-System or Plant and Materials to be tested.
- 6.2.5 The Bidder shall submit a FAT Method Statement to PRASA for acceptance before any FAT commence. The Method Statement shall clearly indicate:
- a) All Systems, sub-Systems and Equipment that shall be included in the FAT and which shall be omitted.
 - b) Specification against which the FAT shall be conducted.
 - c) Method of conducting the FAT for each System, sub-System and Equipment.
 - d) Details, including experience reports, of people which shall be conducting the FAT.
- 6.2.6 The Bidder shall invite PRASA to all FAT taking place at least 40 working days prior to commencing of the FAT. Should PRASA not be able to attend, PRASA shall give the Bidder permission to continue or request the dates for the FAT to be changed. PRASA shall not be held liable for any delays caused by this unavailability.
- 6.2.7 The Bidder shall submit all duly signed FAT Test certificates and associated Test sheet to PRASA for information purposes, prior to Commissioning.
- 6.2.8 PRASA accepts no accountability nor liability for any FAT conducted, despite any checks done or inputs given by any of PRASA's agents.

6.3 Site Acceptance Testing (“SAT”)

- 6.3.1 All relevant EAS Systems, sub-Systems and Equipment shall undergo and pass SAT before Commissioning.
- 6.3.2 The Bidder shall be responsible for SAT.

- 6.3.3 The SAT shall be conducted by a railway signal Engineer or technologist, registered with the Engineering Council of South Africa (“ECSA”) as a professional Engineer or professional technologist and who has undergone training for the specific System, sub-System or Equipment and have experience in SAT.
- 6.3.4 The person(s) responsible for the SAT shall not have been involved in any Design, manufacturing, assembling, FAT or Installation activities relating to the System, sub-System or Plant and Materials to be tested.
- 6.3.5 The Bidder shall submit a SAT Method Statement to PRASA for acceptance before any SAT commence. The Method Statement shall clearly indicate:
- a) All Systems, sub-Systems and Equipment shall be included in the SAT and which shall be omitted.
 - b) Specification against which the SAT shall be conducted.
 - c) Method of conducting the SAT for each System, sub-System and Equipment.
 - d) Details, including experience reports, of people which shall be conducting the SAT.
 - e) Where practical, all SAT shall be done under OBT conditions, prior to the final Testing and Commissioning Occupation.
- 6.3.6 The Bidder shall invite PRASA to all SAT taking place at least 40 working days prior to commencing of the SAT. Should PRASA not be able to attend, PRASA shall give the Bidder permission to continue or request the dates for the SAT to be changed. PRASA shall not be held liable for any delays caused by this unavailability.
- 6.3.7 The Bidder shall submit all duly signed SAT Test certificates and associated Test sheet to PRASA for information purposes, prior to Commissioning.
- 6.3.8 The PRASA accepts no accountability nor liability for any SAT conducted, despite any checks done or inputs given by any of PRASA's agents.

6.4 Final Testing and Commissioning

- 6.4.1 Final Testing and Commissioning shall be done by a PRASA approved Test and Commissioning Engineer (“Tester in Charge”) provided by the Bidder.
- 6.4.2 Once the Bidder is convinced the Bidder shall be ready for Final Testing and Commissioning, he shall agree with PRASA on a suitable date for the activity, at least 90 working days prior to proposed date.
- 6.4.3 The Bidder shall submit a comprehensive Final Testing and Commissioning Method Statement to PRASA for approval before any Commissioning commence.
- 6.4.4 The Bidder shall be responsible to provide a complete Testing and Commissioning team as per the Method Statement, as well as all Tools and Equipment required for introducing, Testing and Commissioning of the System.

- 6.4.5 The members of the Bidder's Testing team shall have not been involved in any Design, manufacturing, assembling, FAT or SAT activities relating to the System, sub-System or Plant and Materials for which that member is responsible during the final Testing and Commissioning.

7 MAINTENANCE

7.1 Overview

- 7.1.1 The Bidder shall Design the EAS in such a manner to minimize Maintenance requirements and ensure overall maintainability.
- 7.1.2 The Bidder shall develop a Maintenance Strategy for the EAS System.
- 7.1.3 Any EAS failure shall be self-announcing and shall lead to a predetermined safe state.
- 7.1.4 It shall be possible to mend EAS breakdowns in a very short time and with a minimum impact on operations.

7.2 First Level Maintenance

- 7.2.1 The Bidder shall perform First Level Maintenance for each Section that has been tested, commissioned and handed over to PRASA from the date of interim hand over to the Completion Date thereafter for 730 calendar days commencing on the Completion Date for the whole of the Works until PRASA issuance of the Performance Certificate thereafter PRASA shall take over Maintenance.
- 7.2.2 First Level Maintenance shall, at a minimum consist of:
 - a) A detailed Maintenance and lifecycle financial model.
 - b) Pre-defined preventative Maintenance.
 - c) Pre-defined corrective Maintenance based on visual inspection of faulty Equipment.
 - d) Modular replacement of faulty Equipment, without the need for any Software or hardware configuration.
 - e) Visual condition assessment.
- 7.2.3 It shall be possible to replace faulty modules, including element controllers without the need to stop the System or turn the power off.
- 7.2.4 The Bidder shall ensure that the transition of Maintenance responsibilities from the Bidder to PRASA (commencing 90 working days prior to the expiry of the Bidder's total Maintenance period) shall be effortless, that there shall be enough training of PRASA personnel. The Bidder shall further ensure that all documentation, policies, procedures and the like relating to the successful continuation of Maintenance, by PRASA, is transparently and effectively handed over to PRASA.

7.3 Second Level Maintenance

- 7.3.1 The Bidder shall perform Second Level Maintenance for each Section that has been tested, commissioned and handed over to PRASA from the date of interim hand over to the Completion Date thereafter for 730 calendar days commencing on the Completion Date for the whole of the Works until PRASA issuance of the Performance Certificate thereafter PRASA shall take over Maintenance.

- 7.3.2 Second Level Maintenance shall, at a minimum, consist of:
- a) A detailed Maintenance and lifecycle financial model.
 - b) Pre-defined corrective Maintenance based on System diagnostics.
 - c) Modular replacement, with the need for basic Software or hardware configuration.
 - d) Condition assessment by means of diagnostic Tools and Equipment.
- 7.3.3 The Bidder shall ensure that the transition of Maintenance responsibilities from the Bidder to PRASA (commencing 90 working days prior to the expiry of the Bidder's total Maintenance period) shall be effortless, that there shall be enough training of PRASA personnel. The Bidder shall further ensure that all documentation, policies, procedures and the like relating to the successful continuation of Maintenance, by PRASA, is transparently and effectively handed over to PRASA.

7.4 Third Level Maintenance

- 7.4.1 The Bidder (with assistance from PRASA) and the Original Equipment Manufacturer ("OEM") (under management of the Bidder and for whom the Bidder shall ensure availability and compliance), shall perform Third Level Maintenance for each Section that has been tested, commissioned and handed over to PRASA from the date of interim hand over to the Completion Date thereafter for 730 calendar days commencing on the Completion Date for the whole of the Works until PRASA issuance of the Performance Certificate thereafter PRASA shall take over Maintenance.
- 7.4.2 Third Level Maintenance shall, at a minimum, consist of:
- a) A detailed Maintenance and lifecycle financial model.
 - b) Undefined and irregular corrective Maintenance based on advanced System diagnostics.
 - c) Modular replacement, with the need for advanced Software or hardware configuration.
 - d) System configuration changes to accommodate infrastructure upgrades and layout changes.
- 7.4.3 The Bidder (with direct support from the OEM) shall ensure that the transition of Maintenance responsibilities from the Bidder and the OEM to PRASA (commencing 90 working days prior to the expiry of the Bidder's total Maintenance period) shall be effortless, that there shall be sufficient training of PRASA personnel. The Bidder shall further ensure that all documentation, policies, procedures and the like relating to the successful continuation of Maintenance, by PRASA, is transparently and effectively handed over to PRASA.

7.5 Fourth Level Maintenance

- 7.5.1 The Bidder and the OEM (under management of the Bidder and for whom the Bidder shall ensure availability and compliance), shall perform Fourth Level Maintenance for

each Section that has been tested, commissioned and handed over to PRASA from the date of interim hand over to the Completion Date thereafter for 730 calendar days commencing on the Completion Date for the whole of the Works until PRASA issuance of the Performance Certificate thereafter the OEM shall take over Maintenance (under supervision from PRASA).

7.5.2 Fourth Level Maintenance shall, at a minimum, consist of:

- a) System upgrades
- b) Changes to the System's core Software
- c) Component level corrective Maintenance

7.5.3 The Bidder shall ensure that the OEM contractually commits to having representation, and providing all necessary Maintenance and/or support, in South Africa for a minimum period of at 240 calendar months post the Bidder's Maintenance, Warranty and Defects Liability period.

8 WARRANTIES

8.1 General

- 8.1.1 The Bidder shall, take interim Warranty responsibility and liability for each Section of that has been tested, commissioned and handed over to PRASA from the date of interim hand over to the Completion Date.
- 8.1.2 The Bidder's full Warranty responsibility and liability period shall be 730 calendar days commencing on the Completion Date for the whole of the Works until PRASA issuance of the Performance Certificate.
- a) Warranties shall, for all EAS related Works at a minimum, be valid and cover:
 - Replacement of all faulty Plant and Materials, Components and labour for all Maintenance Levels described elsewhere in this document
 - Tracking and tracing and correcting of any Software faults
 - b) Failures caused by the environmental and infrastructure conditions as specified throughout the RFP including, but not limited to:
 - Any Plant and Materials or Components damaged due to exposure to extreme direct sunlight and elevated temperatures
 - Any Plant and Materials or Components damaged due to continues exposure to high humidity
 - Any Plant and Materials or Component failure due to corrosion