



Extension of due date for Request for Partnership (RfP)

Subject: Request for Partnership for Selection of Technology Partner for KAVACH (The Indian Railway Automatic Train Protection System)

This has reference to the Request for Partnership published on BHEL's website i.e. www.bhel.com , Ref no. RfP No: **BHEL/AA/TL/0710** dated **July 19, 2023** seeking interest from Company(s), who are willing to partner with BHEL on long-term basis for development, certification/approval of KAVACH system as per system specification no. RDSO/SPN/2020 Ver 4.0 d3 by Research Design and Standards Organisation (RDSO), Indian Railway.

The due date for receiving the proposals against the RfP has now been extended up to Aug 17, 2023.

Prospective partner(s) having proven technology and experience in the Signalling equipment, meeting the PQRs specified in Clause 4 of this RfP are requested to submit their response along with following documents (in hard/soft copy) on or before **August 17, 2023 (Thursday)**:

- i. Company background
- ii. Product catalogue/ Technical features/datasheet
- iii. Existing business in the field of rail transportation sector- Signalling equipment and its services
- iv. Summary of product reference for major supplies in last 10 years
- v. Audited annual report for last three financial years including auditor's note

In case any amendment/corrigendum issued to this RfP, it shall be notified only at www.bhel.com

Contact details for submission of response and for seeking clarifications are as below:

Sr. Deputy General Manager
Corporate Technology Management
Bharat Heavy Electricals Limited
BHEL House, Siri Fort
New Delhi – 110049, India
Phone: +91 11 66337458 / 7213
Mobile: +91 9441176267 / +91 9818103430
Email: techeoi@bhel.in



BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
DELHI - 110049

Notice for Inviting

Request for Partnership

for Selection of Technology Partner for KAVACH
(The Indian Railway Automatic Train Protection System)

RfP Ref No: BHEL/AA/TL/0710

Date of Issue: July 19, 2023

Last date for submission of RfP response: August 03, 2023



Bharat Heavy Electricals Limited

New Delhi-110049, India

Subject: Selection of Technology Partner for KAVACH (The Indian Railway Automatic Train Protection System)

1) Introduction:

This Request for Partnership (RfP) seeks interest from Company(s) who are willing to partner with BHEL on long-term basis for development, certification/approval of KAVACH system as per system specification no. RDSO/SPN/2020 Ver 4.0 d3 by Research Design and Standards Organisation (RDSO), Indian Railway. (<https://rdso.indianrailways.gov.in/uploads/File/System%20Requirement%20specification%20of%20KAVACH.pdf>)

Prospective partner(s) should be able to assist BHEL in the development of KAVACH system (including hardware, software and its associated sub-system), approval from Research Design and Standards Organisation (RDSO), SIL-4 certification of hardware by authorized agency(ies), participation in Signalling & Telecommunication infrastructure development tenders of Indian Railways and erection, commissioning, maintenance and troubleshooting of the commercial orders on long term basis.

2) About Bharat Heavy Electrical Ltd (BHEL):

BHEL is an integrated power plant equipment manufacturer and largest engineering & manufacturing enterprise of its kind in India, catering to core infrastructure sectors of Indian economy viz. energy, transportation, Oil & Gas, heavy engineering industry, renewable & non-conventional energy and defence. BHEL is listed on both major stock exchanges of India (BSE and NSE), wherein Government of India is holding 63.17% of its equity. To position the company as global industrial giant, Government of India categorized BHEL as “**Maharatna Company**” in 2013, empowering the company with enhanced autonomy in decision making.

BHEL has 16 manufacturing units, 4 power sector regions, 8 service centers and 4 regional offices besides a host of project sites spread all over India and abroad. The annual turnover of BHEL for the year 2022-23 was around USD \$2.8 Billion (Rs 23,365 Cr). Highly skilled and committed manpower of approx. 29000 employees, state-of-art manufacturing facilities and technologies have helped BHEL to deliver a consistent track record of performance. With the current order book exceeding US \$ 14 Billion (Rs. 102000 Cr), BHEL is poised for an excellent future growth.

Our ongoing major technology tie-ups include Siemens Energy Global GmbH & Co. KG., Germany (for Steam Turbines, Generators and Condensers); MHI, Japan (for Flue Gas Desulfurization Systems); Leonardo S.p.A, Italy (for Super Rapid Gun Mount); GE Tech. GmbH, Switzerland (for Steam Turbine for Nuclear Power Plant and for Gas Turbines); Vogt Power International, USA (for Heat Recovery Steam Generators); Indian Space Research Organization (ISRO) (for Space Grade Lithium-Ion Cells); CSIR-IIP (PVSA-based Medical Oxygen Plant); NANO Co. Ltd., Korea (for SCR Catalysts); HLB Power Co. Ltd., Korea (for Gates and Dampers); Kawasaki Heavy Industries, Japan (for Stainless Steel Coaches for Metros); Valmet Automation Oy, Finland (for DCS System), Sumitomo SHI FW, Finland (CFBC Boilers) and Babcock Power Environmental Inc., USA (for Selective Catalytic Reduction Systems).

For more details about the entire range of BHEL's products and operations please visit our website <http://www.bhel.com>.

3) BHEL's presence in Railway Transportation Business

BHEL is into the manufacturing of complete electric locomotives and diesel-electric locomotives. Among electrical propulsion equipment, BHEL manufactures and supplies traction motors, traction transformers, power converters (IGBT) & controls, auxiliary converters (IGBT) and vehicle control units for electric locomotives, diesel-electric locomotives and EMUs.

Our manufacturing range includes conventional DC drive, IGBT-based 3-phase drive equipment for various ratings for AC Locomotives, air conditioned and non-air-conditioned EMUs and MEMUs. BHEL has also been in the forefront of providing maintenance and spares/replacement support to Indian Railways for their locomotive fleet. BHEL has full-fledged service department located at major centers in the country.

4) Prequalification Requirements (PQRs):

The Prospective partner(s) shall meet the following conditions as of the last date of submission of this RfP:

4.1 The Prospective partner shall possess design of Train Collision Avoidance System (TCAS/ ATPS/ KAVACH) /European Train Control System (ETCS-1 / ETCS-2) and the product should either have got approved or is currently under the approval stage by RDSO/Indian Railways/European Rail Union/European Rail Traffic Management System.

OR

4.2 The Prospective partner should have designed and supplied at least one product from each set of 4.2.1 & 4.2.2 for Indian Railway/RDSO or for any other country's Railway Company as below:

4.2.1 Signalling Equipment Set-1:

- I. Communication-based Train control systems (CBTC)
- II. Automatic Train Operation System (ATO)
- III. Distributed power wireless control systems (DPWCS)
- IV. Train Protection and Warning systems (TPWS)
- V. Analog/Digital Axle Counters (Single/ Multi-Section)
- VI. Electronics Interlocking (EI)

4.2.2 Signalling Equipment Set-2:

- I. Anti-Collision Device
- II. Cyber Signalling system
- III. Train Control and Management Systems (TCMS)
- IV. Remote monitoring systems (RMS)
- V. Train Automatic Braking Systems
- VI. End-Of-Train Telemetry Systems (EOTT)

Prospective Collaborator to provide relevant certificate(s)/ document to substantiate the PQRs.

5) RfP process:

Prospective partner(s) having proven technology and experience in the Signalling equipment, meeting the PQRs specified in Clause 4 of this RfP are requested to submit their response along with following documents (in hard/soft copy) on or before August 03, 2023 (**Thursday**):

- i. Company background
- ii. Product catalogue/ Technical features/datasheet
- iii. Existing business in the field of rail transportation sector- Signalling equipment and its services
- iv. Summary of product reference for major supplies in last 10 years
- v. Audited annual report for last three financial years including auditor's note

Based on the responses received, evaluation against Clause 4 (PQRs) & the evaluation criteria as per Annexure-4 and discussions with respondents, BHEL will shortlist parties for detailed discussions for technology partnership.

In case any amendment/corrigendum issued to this RfP, it shall be notified only at www.bhel.com

6) Contact Details:

The respondent shall submit signed copy of the RfP along with Annexures, supporting documents specified above in clause 5 of this RfP to the following official:

<p>Sr. Deputy General Manager Corporate Technology Management Bharat Heavy Electricals Limited BHEL House, Siri Fort New Delhi – 110049, India Phone: +91 11 66337458 / 7213 Mobile: +91 9441176267 / +91 9818103430 Email: techeoi@bhel.in</p>

7) Miscellaneous:

7.1 Right to accept or reject any or all Applications:

7.1.1 Notwithstanding anything contained in this RfP, BHEL reserves the right to accept or reject any application and to annul the RfP Process and reject all applications at any time without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons therefore. In the event that BHEL rejects or annuls all the applications, it may, at its discretion, invite all eligible OEMs/suppliers to submit fresh applications.

7.1.2 BHEL reserves the right to reject any applicant during or after completion of RfP process, if it is found there was a material misrepresentation by any such applicant or the applicant fails to provide, within the specified time, supplemental information sought by BHEL.

7.1.3 BHEL reserves the right to verify all statements, information and documents submitted by the applicant in response to the RfP. Any such verification or lack of such verification by BHEL shall not relieve the applicant of his obligations or liabilities hereunder nor will it affect any rights of BHEL.

7.2 Governing Laws & Jurisdiction

The RfP process shall be governed by and construed in accordance with, the laws of India and the Courts at New Delhi (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the RfP process.

Indicative Scope of Technology Transfer

S No	Description of Work	Remarks
1	Design and Development of the KAVACH system at the BHEL Facility	Development of KAVACH system (including Hardware and Software of Stationary KAVACH, Onboard KAVACH and Remote Interface Unit (RIU) etc.), integrated as per the RDSO Specification RDSO/SPN/196/2020 Ver 4.0d3 or latest version, approval from Research Design and Standards Organisation (RDSO), SIL-4 certification of hardware by the authorized agency(ies), erection, commissioning, maintenance and troubleshooting of the commercial orders on a long term basis.
2	Transfer of technological know-how and know-why	<ul style="list-style-type: none"> • Design calculations • Design documents • Bill of Materials • Hardware Architecture • Software architecture • Hardware schemes • Gerber files • Hardware life cycle analysis • Software lifecycle analysis • Software source code • Firmware • Application codes • Braking algorithms • Communication codes • AES Encryption codes • Support drivers for device functionality • Software tools for writing application codes and Firmware codes. • Test Protocols • RAMS Calculations • SIL -4 certificates • RAMS Submissions • Loco TCAS and Station TCAS integration procedures • Station TCAS and Remote Interface Unit (RIU) integration procedures • Station TCAS and Radio Tower, Station TCAS to another Station TCAS communication procedures • Loco TCAS to another Loco TCAS integration procedures. • SIL-4 certification procedure for overall process • SIL-4 certification procedure for overall product • RFID Communication codes • RS 485, RS 232, USB, CAN, OFC and Ethernet Communication codes

		<ul style="list-style-type: none"> • Sub-Systems datasheets and working procedures, testing procedures • Any other relevant information useful for erection, commissioning and troubleshooting of KAVACH is to be submitted.
3	Training and Troubleshooting	<p>Includes support in the form of training BHEL employees for the following modules of TCAS</p> <ul style="list-style-type: none"> • TCAS SIL-4 Architectures • TCAS Hardware Scheme preparation, changes and troubleshooting • TCAS Software Code preparation & Troubleshooting • Algorithm implementation for TCAS Safety cases • TCAS Firmware • TCAS Logics • TCAS – RAMS application • TCAS Firmware updating procedure • TCAS Source code updating procedure
4	Functional Testing and approvals from RDSO/Indian Railways	<ul style="list-style-type: none"> • Support is required for RDSO approval of the system as per the Standards listed below: • TCAS modes and transition • Variation of voltage and interruption of supply as per IEC 60571, 1998. • Supply over voltages and surge test as per IEC 60571, 1998. • Transient Burst and Susceptibility Test as per IEC 60571, 1998. • Radio interference test as per IEC 60571, 1998. • Insulation test as per IEC 60571, 1998. • Applied High voltage tests • Card level/module level tests • Card-level functional checks on each type of PCB modules • Card-level functional tests on each type of PCB modules • Communication peripherals testing • System level diagnostic & functional tests • Environmental tests as specified in the document RDSO/SPN/196/2020 Ver 4.0 d3 • Routine tests as specified in the document RDSO/SPN/2020 Ver 4.0 d3 • Acceptance tests as specified in the document RDSO/SPN/2020 Ver 4.0 d3 • Type tests as specified in the document RDSO/SPN/2020 Ver 4.0 d3 • Integration tests as specified in the document RDSO/SPN/2020 Ver 4.0 d3 • Interoperability tests specified in the document RDSO/SPN/2020 Ver 4.0 d3 or RDSO Purchase order

6	Independent Safety Agency (ISA – SIL 4) certification	<p>Technology partner shall support BHEL for Assembly, integration and commissioning of TCAS system and subsequently SIL-4 certification. Following list of documents may need to be prepared and submitted for ISA-RDSO stage-wise approvals:</p> <ul style="list-style-type: none"> • Component verification reports • System requirement specifications • System assessment reports • System acceptance reports • Test witness reports for generic application and field application • Process and Product reports • Report on Safety Management in TCAS • Reliability calculations • Risk Analysis • FMECA and FTA reports • Maintainability and availability calculations • Failure rates, MTBF and MTTF calculations • RBD and Voter system reports • RAMS life-cycle reports • First site specific application case reports
7	After-Sales support	<ul style="list-style-type: none"> • BOM changes • Schematics and revision • Source code and updates • Firmware and updates • Reliability improvements
8	Software & Hardware	<ul style="list-style-type: none"> • Software for running TCAS should comprise Algorithm, Source code, Firmware and device drivers that can be used by BHEL in various TCAS projects without any limitations. • Hardware should comprise schemes of all control cards with information and detailed datasheets of all latest Chipsets that can be supported by OEM for the next 10-15 Years. • Software & Hardware should be as per relevant CENELAC standards (EN 50126, EN 50128, EN 50129 and EN 50121) compliant with SIL-2/SIL-3/SIL-4 specification and certified by Independent Safety Assessor (ISA) approved by RDSO.
9	Intellectual Property Rights	<ul style="list-style-type: none"> • IP Rights of TCAS products developed with help of technology obtained from Technology partner shall remain with BHEL.
10.	Supply, erection, and commissioning of prototype for KAVACH	<ul style="list-style-type: none"> • Separate purchase order for supply, assembly, testing, and commissioning of (complete/partial) sets of Stationary KAVACH, Loco KAVACH and Remote Interface Unit (RIU) may be placed by BHEL's Electronic Division, Bengaluru.

Prospective Partner's Experience in the field of Signalling Systems for Railways

Sl. No.	Requirement	Remarks with details
(a)	Whether the Prospective partner has design of Train Collision Avoidance System (TCAS/ ATPS/ KAVACH), the product should either have got approved or is currently under the approval stage by RDSO/Indian Railways.	
(b)	Whether the Prospective partner has designed/ supplied European Train Control System (ETCS-1 / ETCS-2) approved by European Rail Union/European Rail Traffic Management System.	
(c)	Whether the prospective partner has designed and supplied Signalling Equipment (for Indian Railway/RDSO or for any other country's Railway Company) specified below: I. Communication-based Train control systems (CBTC) II. Automatic Train Operation System (ATO) III. Distributed power wireless control systems (DPWCS) IV. Train Protection and Warning systems (TPWS) V. Analog/Digital Axle Counters (Single/ Multi-Section) VI. Electronics Interlocking (EI)	
(d)	Whether the Prospective partner has designed and supplied Signalling Equipment (for Indian Railway/RDSO or for any other country's Railway Company) specified below: I. Anti-Collision Device II. Cyber Signalling system III. Train Control and Management Systems (TCMS) IV. Remote monitoring systems (RMS) V. Train Automatic Braking Systems VI. End-Of-Train Telemetry Systems (EOTT)	
(e)	Whether the Prospective Partner has executed at least one single work contract of design, supply, installation, testing & commissioning of Signaling & Train-Control system/ Train collision avoidance system during the last 5 years.	
(f)	Whether the Prospective Partner is an OEM/supplier of LOCO TCAS system approved/under approval by RDSO	
(g)	Whether the Prospective Partner is an OEM/supplier of Station TCAS system approved/under approval by RDSO	
(h)	Whether the Prospective Partner is an OEM/supplier of SM-OCIP approved/under approval by RDSO	
(i)	Whether the Prospective Partner is an OEM/supplier of RFID Reader approved/under approval by RDSO	
(j)	Whether the Prospective Partner is an OEM/supplier of Brake Interface Unit approved/under approval by RDSO	

(k)	Whether the Prospective Partner is an OEM/supplier of Radio Tower approved/under approval by RDSO	
(l)	Whether the Prospective Partner is an OEM/supplier of RFID Tags approved/under approval by RDSO	
(m)	Whether the Prospective Partner confirms its willingness to facilitate BHEL in establishing required manufacturing/assembly, integration and test facilities for KAVACH Systems for Railways	
(n)	Whether the Prospective Partner has been blacklisted / banned business dealings for Ministry of Railways or any Government Department of India.	
(o)	Whether details of company background, product catalogues have been enclosed.	
(p)	Whether copy of the Prospective Partner annual audited financial reports for last 5 years has been enclosed.	
(q)	Whether a summary of experience & references have been enclosed.	
(r)	Whether the Prospective Partner owns the IPRs for the technology being proposed) or have unencumbered right from the owner of the IPRs to sub-license the technology, if applicable. If yes, list of such IPRs to be enclosed.	
(s)	Whether the Prospective Partner confirmed the Transfer of essential technology to BHEL to enable BHEL to design, engineer, manufacture, assemble, quality control, test, supply, install, commission, repair, service and retrofit state-of-the-art KAVACH Systems for Railway.	

(SIGNATURE)



Bharat Heavy Electricals Limited

New Delhi-110049, India

Annexure -3

Reference List: The Prospective partner shall furnish summary of their major supplies in last 10 years:

Sr. No.	Year of Supply	Name of Customer	Description of System/sub-system supplied	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

(SIGNATURE)

Evaluation Criteria

- 1.0 Response of prospective partner(s) who do not meet the Pre-Qualification Requirement as per clause 4 of this RfP, will not be considered for evaluation.
- 2.0 Shortlisting of prospective partner(s) shall be done on the basis of the “Technical Quality” evaluation criteria specified below and PQRs specified in Clause 4 of this RfP. *(The prospective partner shall share suitable supporting documents, wherever applicable)*
- 3.0 Only responses of respondents qualifying the PQRs and with minimum score of 40 marks out of 100 marks will be shortlisted for further discussions with BHEL.

Sl. No	Parameters	Marks - Y (Max Marks -10)		Prospective Collaborator's Claim/Response
1.	Prospective Technology partner has worked on - Embedded control systems design and development a. SIL-4 Product b. SIL-2 Product Proof: Self certified letter with supporting documents shall be submitted.	Type of Controller	Marks (Y1)	
		a. SIL-4	10	
		b. SIL-2	5	
		Total	Y1/10	
2.	Prospective Technology partner has worked on Traction application - Embedded control systems communication peripherals a. Ethernet b. RS 485 c. CAN d. USB e. OFC Proof: Self certified letter with supporting documents shall be submitted.	Communication protocol	Marks (Y2)	
		Ethernet	2	
		RS 485	2	
		CAN	2	
		USB	2	
		OFC	2	
		Total	Y2/10	
3.	Prospective Technology partner has worked on a) UHF communication b) GPS communication c) GSM communication d) LTE communication e) Cloud Data communication Proof: Self certified letter with supporting documents shall be submitted	Communication	Marks (Y3)	
		UHF com	2	
		GPS com	2	
		GSM com	2	
		LTE com	2	
		Cloud com	2	
		Total	Y3/10	
4	Patents in Indian/Global market of the prospective TOT partner in the area of products mentioned in clause 4.2 Proof: Patent Filing applications, Patent acceptance letters should be submitted.	No of Patents	Marks (Y4)	
		2	10	
		1	5	
		Total	Y4/10	

Sl. No	Parameters	Marks - Y (Max Marks -10)	Prospective Collaborator's Claim/Response																						
5	<p>Prospective Technology partner has worked on Traction application - Embedded control systems Hardware, Firmware, Algorithm and Software development</p> <p>a. Automatic Train Protection System b. Electronic Interlocking c. Train Control Management Systems d. Digital Axle Counters e. Communication based Train Control System</p> <p>Proof: Self certified letter with supporting documents shall be submitted</p>	<table><tr><th>Type of Algorithm</th><th>Marks (Y5)</th></tr><tr><td>ATPS</td><td>2</td></tr><tr><td>EI</td><td>2</td></tr><tr><td>TCMS</td><td>2</td></tr><tr><td>DAC</td><td>2</td></tr><tr><td>CBTC</td><td>2</td></tr><tr><td>Total</td><td>Y5/10</td></tr></table>	Type of Algorithm	Marks (Y5)	ATPS	2	EI	2	TCMS	2	DAC	2	CBTC	2	Total	Y5/10									
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ATPS	2																								
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TCMS	2																								
DAC	2																								
CBTC	2																								
Total	Y5/10																								
6	<p>Willingness to share exclusive IP rights in India for the proposed Technology partnership</p>	<table><tr><th>Agreed</th><th>Marks (Y6)</th></tr><tr><td>Yes</td><td>10</td></tr><tr><td>No</td><td>0</td></tr><tr><td>Total</td><td>Y6/10</td></tr></table>	Agreed	Marks (Y6)	Yes	10	No	0	Total	Y6/10															
Agreed	Marks (Y6)																								
Yes	10																								
No	0																								
Total	Y6/10																								
7	<p>RAMS / CENELEC /IEC certification experience of the TOT Partner/Vendor,</p> <p>Proof: Test certificates required</p> <p>1. EN50126 2. EN50128 3. EN50129 4. EN50155 5. EN50121-4 6. EN50159 7. EN50238 8. IEC61373 9. IEC62443</p> <p>Or equivalent standards</p> <p>Additional marks for 50155 as it covers for all Electronic Equipment on Rolling Stock</p>	<table><tr><th>Standards</th><th>Marks (Y7)</th></tr><tr><td>a. EN 50126</td><td>1</td></tr><tr><td>b. EN 50128</td><td>1</td></tr><tr><td>c. EN 50129</td><td>1</td></tr><tr><td>d. EN 50155</td><td>2</td></tr><tr><td>e. EN 50121-4</td><td>1</td></tr><tr><td>f. EN 50159</td><td>1</td></tr><tr><td>g. EN 50238</td><td>1</td></tr><tr><td>h. IEC 61373</td><td>1</td></tr><tr><td>i. IEC 62443</td><td>1</td></tr><tr><td>Total</td><td>Y7/10</td></tr></table>	Standards	Marks (Y7)	a. EN 50126	1	b. EN 50128	1	c. EN 50129	1	d. EN 50155	2	e. EN 50121-4	1	f. EN 50159	1	g. EN 50238	1	h. IEC 61373	1	i. IEC 62443	1	Total	Y7/10	
Standards	Marks (Y7)																								
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f. EN 50159	1																								
g. EN 50238	1																								
h. IEC 61373	1																								
i. IEC 62443	1																								
Total	Y7/10																								
8	<p>Financial Strength:</p> <p>a. Net Worth at end of last financial year</p> <p>b. Profitability {Earnings or Profit before tax but after interest} shall be positive in at least two financial years out of last five financial years.</p> <p>Note: Last 5 years means FY2022-23, FY2021-2022, FY 2020-2021, FY 2019-2020, FY 2018-2019</p>	<table><tr><th colspan="2">Financial Strength Marks (Y8)</th></tr><tr><td>Net worth > 5 Cr</td><td>2</td></tr><tr><td>Net worth > 25 Cr</td><td>4</td></tr><tr><td>Profitable in 3 out of previous 5 FY</td><td>2</td></tr><tr><td>Profitable in 4 out of previous 5 FY</td><td>4</td></tr><tr><td>Profitable in 5 out of previous 5 FY</td><td>6</td></tr><tr><td>Total</td><td>Y8/10</td></tr></table>	Financial Strength Marks (Y8)		Net worth > 5 Cr	2	Net worth > 25 Cr	4	Profitable in 3 out of previous 5 FY	2	Profitable in 4 out of previous 5 FY	4	Profitable in 5 out of previous 5 FY	6	Total	Y8/10									
Financial Strength Marks (Y8)																									
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Total	Y8/10																								

Sl. No	Parameters	Marks - Y (Max Marks -10)	Prospective Collaborator's Claim/Response														
9	<p>The willingness of the Prospective Technology partner for the proposed TCAS agreement to supply Sub-systems/ components/ products to BHEL for the prospective TCAS orders to be executed</p> <p>1. Remote Interface Unit 2. Station TCAS 3. Loco TCAS 4. Network Monitoring System 5. RFID Tags and RFID Readers</p>	<table><tr><th colspan="2">Supply as per BHEL requirements – Marks (Y9)</th></tr><tr><td>Supply of TCAS components – 5</td><td>10</td></tr><tr><td>Supply of any 4 TCAS components</td><td>8</td></tr><tr><td>Supply of any 3 TCAS components</td><td>6</td></tr><tr><td>Supply of any 2 TCAS components</td><td>4</td></tr><tr><td>Supply of any 1 TCAS component</td><td>2</td></tr><tr><td>Total</td><td>Y9/10</td></tr></table>	Supply as per BHEL requirements – Marks (Y9)		Supply of TCAS components – 5	10	Supply of any 4 TCAS components	8	Supply of any 3 TCAS components	6	Supply of any 2 TCAS components	4	Supply of any 1 TCAS component	2	Total	Y9/10	
Supply as per BHEL requirements – Marks (Y9)																	
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Supply of any 3 TCAS components	6																
Supply of any 2 TCAS components	4																
Supply of any 1 TCAS component	2																
Total	Y9/10																
10	<p>Prospective Technology partner has implemented any project with following:</p> <p>a. SIL-4 architecture of Hardware b. SIL-4 architecture of Software c. RAMS standards and application d. AES Encryption and communications e. RFID Tags & Reading</p>	<table><tr><th colspan="2">Criteria and Understanding Total Marks - 10 (Y10)</th></tr><tr><td>SIL- 4 Hardware</td><td>2</td></tr><tr><td>SIL 4 Software</td><td>2</td></tr><tr><td>RAMS Standards</td><td>2</td></tr><tr><td>AES Encryption</td><td>2</td></tr><tr><td>RFID Communication</td><td>2</td></tr><tr><td>Total</td><td>Y10/10</td></tr></table>	Criteria and Understanding Total Marks - 10 (Y10)		SIL- 4 Hardware	2	SIL 4 Software	2	RAMS Standards	2	AES Encryption	2	RFID Communication	2	Total	Y10/10	
Criteria and Understanding Total Marks - 10 (Y10)																	
SIL- 4 Hardware	2																
SIL 4 Software	2																
RAMS Standards	2																
AES Encryption	2																
RFID Communication	2																
Total	Y10/10																
	Total Marks (Y) obtained for all Parameters	Y = Y1 + Y2+ Y3+ Y4+Y5+Y6+Y7+Y8+Y9+Y10															