KERALA MEDICAL SERVICES CORPORATION LTD
(A Government of Kerala Undertaking)
Thycaud P.O, Thiruvananthapuram - 14, Kerala.
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CIN: U24233KL200TSGC021616, PAN : AADCK4029M, GSTIN : 32AADCK4029M1ZK

Running Contract Details	
Equipment Name	PACS
Running Contract Valid Till	08-05-2027
Tender Ref No	KMSCL/EP/T557/1198/2024
Tendered Quantity	3
Supplier Name	M/s Medsynaptic Pvt Ltd
GST No	27AADCM8986H1ZU
Installation & Delivery Period	18 Week(s)
Up-time / PM vist	95% & 4 Visits per year
Warranty period	3 Years

Supplier`s Details		
Address	**Contact Details**	
5th floor Manikchand Galleria Off S.B.Road Model Colony Shivaji Nagar Pune-411016	Contact Person	Mr.Sanjay Gorde
	Phone	
	Mobile No	9822430048
	Email	gorde@medsynaptic.com

Item-wise Price Details

#	Item Details	Unit Rate (Incl.all taxes & charges)	Service Charges (Through KMSCL)	Grand Total
1	**PACS** *Model & Make : 5.x / Medsynaptic Pvt Ltd*	5900000 Incl.GST :18%	413000	6313000
2	**Advance 3D visualisation with hardware**	5310000 Incl.GST :18%	371700	5681700
3	**2 U rack server with high availability**	1062000 Incl.GST :18%	74340	1136340
4	**AD Server**	590000 Incl.GST :18%	41300	631300
5	**SAN Storage**	1062000 Incl.GST :18%	74340	1136340
6	**NAS Storage**	1829000 Incl.GST :18%	128030	1957030
7	**Storage at DR Site**	1829000 Incl.GST :18%	128030	1957030

Item-wise Price Details				
8	**Radiology Workstation without monitor**	129800 Incl.GST :18%	9086	138886
9	**PACS Workstation diagnostic 6 MP 30" monitor**	737500 Incl.GST :18%	51625	789125
10	**PACS Workstation diagnostic 5 MP 21" monochrome monitor**	590000 Incl.GST :18%	41300	631300
11	**PACS Workstation diagnostic 12 MP 31" monitor**	1416000 Incl.GST :18%	99120	1515120
12	**PACS Workstation diagnostic 3 MP 21" monito**	330400 Incl.GST :18%	23128	353528
13	PACS Workstation diagnostic 2 MP 21" monitor	236000 Incl.GST :18%	16520	252520
14	**24" Clinical review monitor**	90860 Incl.GST :18%	6360.2	97220.2
15	**Desktop Computer for Viewing station**	70800 Incl.GST :18%	4956	75756
16	**All in one computer for viewing station**	82600 Incl.GST :18%	5782	88382
17	**VR Server hardware**	118000 Incl.GST :18%	8260	126260
18	**Speech Mic**	118000 Incl.GST :18%	8260	126260
19	**Firewall with min 400 concurrent support**	354000 Incl.GST :18%	24780	378780
20	**20KVA UPS with 60 minutes back up**	944000 Incl.GST :18%	66080	1010080
21	**20KVA UPS with 15 minutes back up**	708000 Incl.GST :18%	49560	757560
22	**10 KVA UPS with 30 minutes back up**	649000 Incl.GST :18%	45430	694430
23	**CD DVD publisher**	796500 Incl.GST :18%	55755	852255
24	**Film Digitizer**	472000 Incl.GST :18%	33040	505040
25	**600 VA UPS with 15 minutes back up**	7080 Incl.GST :18%	495.6	7575.6
26	**Regular printer**	30680 Incl.GST :18%	2147.6	32827.6
27	**Heavy Duty laser Multifunctional A3**	472000 Incl.GST :18%	33040	505040

Item-wise Price Details				
28	**Core Switch 24 port**	708000 Incl.GST :18%	49560	757560
29	**Unmanaged switch 24 port**	6490 Incl.GST :18%	454.3	6944.3
30	**Secure tunneling SF Server**	531000 Incl.GST :18%	37170	568170
31	**Core router**	944000 Incl.GST :18%	66080	1010080
32	**KVM Switch**	34220 Incl.GST :18%	2395.4	36615.4
33	**Tab**	27140 Incl.GST :18%	1899.8	29039.8
		28186070	**1973024.9**	**30159094.9**

Annual / Comprehensive Maintenance Charges (Exl.Tax)				
Rate	**4th Year**	**5th Year**	**6th Year**	**7th Year**
PACS				
Labour	30,00,000.00	30,00,000.00	36,00,000.00	36,00,000.00
Comprehensive	30,00,000.00	30,00,000.00	36,00,000.00	36,00,000.00

Other terms & conditions

1. The supplier shall execute an agreement with the purchaser as per tender conditions (agreement format is given in the tender document).

2. The supplier shall submit performance security amounting to 5.00% of the value of the supply order.

3. The labour & comprehensive charges of equipment after the completion of warranty period is finalized by KMSCL as mentioned above.

4. Since discount rate is not applicable for equipment under Running Contract of KMSCL, purchase/supply order can be issued directly to supplier at the given rate with tax & other charges (exclusive of KMSCL service charges).

5. If purchase/supply order is issued directly to the supplier, KMSCL service charge need not be paid. But the copy of the said order may be forwarded to KMSCL for information.

Technical Specification

Equipment :PACS

Technical Specification

Technical Specification for Picture Archiving and Communications System(PACS)RadiologyinformationSystem (RIS),VendorNeutralArchive(VNA)

Vendor Qualification Criteria

RIS/PACS quoted should be a company registered in India for minimum 10 years or above.

PACS shall be fully web based in most of its deployed areas. The Vendor may use proprietary applications for Radiology Workstations to be installed. This is to avoid the need to install application in thin clients which are to be attached to PACS.

PACS should have a recent US FDA / CE certificate issued and CDSCO certified. Bidder must provide / submit a certificate.

Thequoted PACS solution OEM must have ISO 9001 & ISO 13485 Certification.

3rd party solution integration is allowed for Advance 3D post processing tools however must be seamless. Advance 3D post processing OEM should have trained application specialist available in India for last 5 years. PACS Vendor should take full responsibility of all 3rd party products like advanced 3D software, hardware, networking and turnkey.

Vendor should have successfully completed and running similar /equal type of project in Central/state Govt institution – Should submit the latest end user certificate addressing to tendering Authority

RIS/PACS Vendor should have at least 1 trained Engineer based out of Kerala

Vendor should be capable of doing seamless integration of existing 3D workstations in department if the existing workstation license allows for the same

Overview of Operations and Introduction to the vision of the department

This section provides examples of the clinical operation of the system(s)as envisioned by Client to aid in understanding the desired functionality. Bidder must complywiththese.

There are five main building involved where the modalities are installed which will be the data input to PACS. They are

Surgical Block – This is where the main PACS server and the Reporting rooms are envisioned. There is – One MRI, One CT, Two X-ray Machines, three ultrasound, One Fluoroscopy and two Mammography machined currently planned to be installed. There are few portable X-ray machines in this building. More modalities maybe added in future. This block has networking scope along with infrastructure works. The successful bidder has to provide the missing links in order to install viewing stations across this block.

Oncology Block – This building is located separately from the surgical block. There is one CT Machine in this block. This is a potential site for installation of PET CT in future.

Casualty Block – This is located separately from the surgical block. There is one CT, one MRI, one DR, one CR, one ultrasound and one single plane DSA machine currently in this location. More modalities may be added in future.

OP Block – This building is located separately from the surgical block. There is one DR Machine in this block. Networking may have to be done.

CTVS Block – This building is located separately from the surgical block. There is two cathlabs and one CR machine in this block. Networking may have to be done.

A new super specialty block is being developed which may have more modalities being added in future.

The newly installed PACS system should be able to intergrade all these modalities. The future modalities of radiology which may be installed should also be able to be integrated to the existing PACS System.

The department, before any radiological investigation will create a unique ID number which will be allotted to the patient. Best efforts will be made to not duplicate this. However, if there is duplication, the PACS system should be capable of integrating the IDs to one patient.

This will be done at counters placed in multiple areas including the above-mentioned blocks. This module (patient registration) should be capable of running in thin clients both in LAN as well as Internet. Post registration, a scheduling option should be available which can allot cases to the modalities. The status of scheduling should be visible in the RIS System for anyone who has access for the same. The worklist should automatically update in the modality for the day from which the radiology technician will be able to select. This should lead to automatic entry of patient demographics for the study. The individual studies will be identified using accession numbers.

Any emergency exam conducted will be done on emergency ID number. The PACS should have the capability of allowing select users to editing the ID number when required.

The department envisions itself to go paperless in future all efforts will be made for the same. In this regard, there should be facility to

Fill request forms online through internet or intranet

Send scheduling information to patients mobile/email from the RIS

Share reports to patients after the generation

Send report to doctors who are marked as related to patient care

RIS should have facility for registration, scheduling and billing module. Billing and registration should have reverse link with HIS and current billing software so long as they are HL-7 compatible

There will be designated areas for Hardcopy and CD Printing if at all required.

Should have facility for uploading outside images in the form of Digitized film or CD and label with a specific hospital number.

All Individuals involved in the system including radiology doctors, other department doctors, radiographers at various levels of authority, other hospital staff etc. will be given a unique ID and password in accordance with policy decided by the department of radiology. Each ID will have preset privileges for performing specific functions in the PACS system.

Diagnostic Reporting: Using Digital Dictation or Template based reporting, authorized users will access worklists of unread exams for dictation. Relevant historical exams, along with their reports, will be available for simultaneous display at the time of diagnosis, if so required, having been previously retrieved by an automatic pre- fetching process. Users will generally monitor worklists based on modalities; however, it will also be possible to find specific patients by Name, Patient ID number or Accession number. During a diagnostic session, a user will be able to select a specific case from the list or automatically move sequentially down the list. In the latter case, after completing the dictation, the PACS will automatically change the status of the current exam to indicate that it has been read, close the exam, and open the next one in the worklist. When displaying an exam or a set of related exams for a diagnostic session, the system will automatically present the images in a reasonable arrangement to speed the process. Window width and level and image rearrangement will be used frequently. Following Digital Dictation/transcription, the dictated report will be available in the PACS and be accessible for display at the workstations. Subsequent changes to the contents or status of the report will also be available in the PACS. Report approval (sign-off) will be possible on the PACS workstation, in which case the status change will be sent to the RIS/HIS.

PhysicianReview:Authorizeduserswillsubmitqueriestothesystemdatabasebychoosingoneofaselectionofpredefinedworklistsorviews,thereby accessinglistsofexams, folders, and patients. Reports for exams will be visible on the workstation. Window width andlevelandimagerearrangement will beused frequently.

In future the hospital expects to have a Hospital Information system. This will be either in the form of e-health proprietary software developed by Kerala government or a software bought by the government. Whichever the case, it is expected that the PACS vendor takes all possible steps for the integration of RIS/PACS system to the same, if HL7 compatible.

Performance of the solution should be consistent and 98% uptime of the working of the system should be ensured.

After 10 years if required, the data migration to new PACS shall be done by the successful bidder.

Thus, the scope of work of vendor is as follows:

Setup and maintain Hardware related to PACS including Servers and Storage

Setup and maintain software related to PACS including server and storage

Setup and maintain RIS software necessary for functioning of department

Deploy and maintain interbuilding network necessary

Deploy and maintain intrabuilding LAN in Surgical block, CTVS block and Emergency block (details provided below)

Setup hardware and software required for internet functionalities and security related to the system

Civil work and establishment of Radiology reporting room including the workstation.

Purchase and maintenance of thin clients mentioned below for PACS system

Additional hardware including CD writing, CD copying, film digitizer etc. as mentioned below.

The detailed specification that follows shall be understood to be minimum requirement.

General requirements: Site preparation and installation: The project should be executed on a turnkey basis. It is the responsibility of the vendor to install the system, integrate it with the existing solution, perform the turnkey (civil, electrical and air-conditioning) work that may be required to ready the site for installation with full functionality, train the staff and supply essential consumables required for the full functioning of their system. Turnkey work of disaster recovery server room should also come in its scope.

1. Civil and Finishing work in Server Room and Disaster recovery room.

Sl No	Description
A.	Data Centre works on turnkey basis including raised floor with antistatic material and Air conditioning, false ceiling, access control door, power points, furniture, space partition for PACS on -site Engineer, furniture (table and chair), lightings, earthing
B.	Setting up of disaster recovery server room on turnkey basis. Brick / other material wall partition, raised floor with antistatic material, Air conditioning, false ceiling, access control door, power points, furniture (table and chair), lightings, earthing.
C.	Tables and Chairs required for the PACS engineers room Godrej, Wipro or Bloster or feather-lite make or equivalent)

1. Civil and Finishing work of the Radiology Reporting Room

1	Radiology reporting room works on turnkey basis including wooden floor, Air conditioning, false ceiling, access control door, power points, furniture, lightings, earthing. A total of 15 cubicles have to be designed with one workstation in each cubicle. There should be facility for 6 plug points per cubicle. There should be both indirect and direct lighting facility with switch to regulate the amount of light in the room.
2	Supplying and installation of Medium Back revolving Chairs for workstation, Conference Hall and Training room (With Synchronized Tilt Mechanism, Zero position tilt lock, Pneumatic Height Adjustments, ABS Back Rest & Seat, PU Arm Rest, Nylon base with castors) (Godrej, Wipro or Bloster make or feather-lite or equivalent)
3	Supplying and installation of High Back revolving Chair for Cabin (With Synchronized Tilt Mechanism, Zero position tilt lock, Pneumatic Height Adjustment, Dual ply Backrest, seat with ABS, contoured seat mold, Chromed Adjustable armrest, Chromed Base with castors) (Godrej, Wipro or Bloster or feather-lite make or equivalent).
4	Supplying and installation of Visitors chair, PU Arm rest, Non revolving, back and seat with ABS, countoured seat mould, (Godrej, Wipro or Bloster or feather-lite make or equivalent)
5	Storage cabinet for accessories: Storage cabinet for accessories in 19 mm pre-laminated ply board construction having sides, top, front, openable panels laminate finish with internal horizontal shelf 19mm commercial plywood painted (enamel) as per approval. Front panels to have a locking arrangements with one panel having tower bolt on the inner side with handles, magnetic hinges and all complete.
6	Providing, making and fixing in position partition walls over a wooden frame work of size 50x50mm with hard wood Pinkoda /Violet/ or equivalent frame work at 60cm or nearest as verticals and three numbers of horizontals, spacing as shown in the drawing with 10mm/ 12mm thick marine plywood on two sides of the frame work for a height of 90cm from the bottom or nearest and 5.50mm or nearest thick plain glass/ frosted glass for the remaining height and fixing glass/plywood with teak wood beadings between glass/plywood and wooden frame with suitable junction joints and extra supports if needed for joinery openings. The plywood is fixed to the frame work using steel screws including finishing the joints with joint filler etc.to get smooth and even finished joints including cost and labour charges of all materials and the outer frames fixing to concrete/masonry by chipping and providing tight plugs, making good the damages, including

	cost of all materials such as all wooden members, plywood on both sides, glass etc. complete, wooden sections confirming to the nearest dimensions etc.for fixed partitions etc complete as in the drawing and as per requirement. The rate inclusive of all material charge, labour, transportation, Scaffolding (If needed) loading/unloading at the work space etc. complete as per the direction of engineer in charge.
7	Extra for Providing and fixing flush doors with decorative veneering instead of non decorative ISI marked flush door shutters conforming to I.S. 2202 (part I) On one side only
8	Providing and fixing magnetic catcher of approved quality in cupboard/ ward robe shutters, including fixing with necessary screws etc. complete. Triple strip vertical type
9	Providing and fixing special quality chromium plated brass cupboard locks with six levers of approved quality including necessary screws etc. complete. Size 65 mm
10	Computer table (long) with keyboard tray, CPU storage at base in a side and storage drawers at other side. Size 1.2m x 0.6m x 0.75m (h) thickness of sheet shall be 12mm, marine plywood with mica/ vineer lipping, edge band with PVC or teakwood reaper. reputed brand godrej/ featherlite/ wipro

UPS Support System for the Server Setup and department in general:

Sl. No.	Specifications
1	UPS 20 / 20 / 10KVA On line UPS with Isolation transformer and static bypass switch, Floor Mounted Type.
2	Technology True on Line UPS with double conversion, APFC IGBT (for both Rectifier and Inverter) based UPS
3	Output Capacity (KVA) as per specification given below Output Capacity (KW) as per specification given below
4	DC Bus Voltage 72 VDC / 120 DC
5	Input line Low/High Transfer 320 VAC to 470 VAC at 100% load 300 VAC to 470 VAC < 60% load
6	Input Frequency range 47.5 to 52.5 Hz
7	Input Power Factor >=0.95
8	Output Voltage 230VAC single phase +/-2% at full load
9	Output Frequency (Free running) : 50Hz +/-0.5%
10	Output Wave Form Pure sinusoidal Wave
11	Output Harmonic Distortion <=3% for 100% (Linear Load) <=7% for 100% (non Linear Load)
12	Output Power Factor 0.8
13	Output Crest Factor Minimum 3:1 at full load
14	Overall efficiency of UPS at normal mode >85% rated load linear & nonlinear load
15	Inverter Overload Capacity 130% of overload for 60 Seconds 110% of over load for 10 minutes.
16	Isolation Transformer Built in Galvanic isolation Transformer should be provided at UPS input.
17	Automatic Bypass Switch (Bi-directional) for all ratings Should be provided and should take care of 100% load transfer.
18	UPS shutdown UPS should shutdown with an alarm & indication on
19	Cooling system of UPS Forced Air
20	UPS Operating Temperature (Environment)0 to 40 Deg C at full load. > 40 to upto 50 Deg C for < 80 % load, > 50 to upto 55 Deg C for < 60 % load
21	SNMP Management/Web enabled interface Required built in
22	Auto Retransfer, Cold start, Manual Service Bypass Required built in OR external
23	Protection Electronics protection for devise safety Soft starts rectifier and inverter, battery current Limiting, overload protection and output short circuit Protection.
24	Indication/LCD Display Mains ON, Inverter ON Battery On charge, Mains Over/Under Voltage, Mains fail, Low battery, DC Over/Under Voltage, Inverter

	Overload, Load on inverter, Bypass on, Battery run time
25	Metering DC voltage, Input Voltage, Output Voltage & Output load level in %.
26	Audible alarm Main Failure, Low Battery, on bypass, Overload
27	Manufacturer should be ISO 9001:2015, ISO 14001 certified & BIS certificate to be produced for offered Models of 2kva online UPS.
28	Battery Rack Aesthetically finished MS Rack or wooden rack to house the Batteries of each UPS.
29	Battery Make Exide or Quanta
30	Battery Charger Constant Voltage Constant Current
31	Minimum Charger Current 10% of the Battery AH
32	Battery recharge time (after complete discharge) to 100% charge Battery recharge time should not exceed 12 hrs.
34	BATTERY BACKUP TIME as per specification given below
	UPS provided in server room and recovery room shall have power failure SMS and online alert to at least 5 mobile numbers.

1.System Architecture

2. TheBidder should havetheOperatingSystemfor all majorServersbeWindows or equivalent.

3. PACS solution should be on a High Availability with Active - Active mode with hardware redundant servers along with load balancers using Virtualization technology so that the offered solution should have No single point of failure. The offered solution will have 98% uptime on complete offered solution. PACS implementation should support with the ISPs internet connectivity with 100 Mbps or more bandwidth. The Hospital will provide highspeed internet to the PACS Server room, however the vendor should arrange for an alternate internet connection with high band width and static IP in case of internet failure from hospital end.

4.Vendor should create disaster recovery solution in another location

5. The Bidder should have the Operating System for the Diagnostic Display stations be Windows or similar.

6.The Bidder should have the Operating System for the Clinical Display stations be Windows or similar.

7. The Bidder shouldhavetheBrowserusedinconjunctionwiththeWebbasedstationsbeMSInternet Explorer /Chrome/ Firefox/Safari.

8. The Bidder should have the PACS Administrator’s software tools be web accessiblefromanyPC as opposedto be installed on aspecificPC (Admin Station).

9. DICOMConformancestatementofthequotedproductshouldbesubmitted.

10. The bidder should provide good quality three tablet devices (Samsung/ipad) to access and edit the network from anywhere and should have provision to access and edit network through mobile phones.

1. Major requirements

11. The PACS shall be Fully Web Based in most of its deployment with Clients used only for workstations. All users should be able to access diagnostic viewer through any standard browser. Application should be browser agnostic.

12. With the intention of Client to eliminate paper, the bidder shall include a strategy for document scanning and management of the application that can be integrated into the PACS.

13. PACS should support multithreading technology for DICOM communication.

14. There should be no restriction of License in PACS based on exams per annum.

15. Offered PACS should support high volume reading (lots of cases, large cases, across modalities).

16. Solution should support image viewing from Tabs like Samsung Galaxy & IPAD or mobiles. Should provide unlimited concurrent user license

17. OfferedsystemshouldhaveacommonGUIforallPACSworkplaces.

18.PACS should support and connect unlimited modalities both present & future. No extra license cost will be applicable for any new modality connectivity.

19. PACS should integrate bidirectional with HIS/EMR in future, if HL7 compatible.

20. ABHA ID should be integrated and all the E-health application need to be integrated in future, if HL7 compatible.

21. PACS vendor should do the seamless integration with existing 3D advance visualization software in the department. 3D viewer should launch from PACS work list

22. Should not use any ActiveX technology

1.System

23. Theproposalshallincludeadetaileddescriptionofthearchitectureofthesystem,documentingthesystemtopologyandthecomponents of thesystem.

24.The system shall meet all performance requirements in this specification with thedatabasestoring 10 years**examinations**. Should propose the upgradable storage box

25.The system shall support system-wide authentication of users using auniqueuser-IDandpasswordforeachuserorthroughanalternativeapproachwithequivalentresult.

26.Thebiddershallprovidemechanisms to assure the security of all system components to minimize loss of equipment or data due to theft or malicious tampering. Bidder should provide secure tunneling or equivalent technology.

27.The system should provide same user interface to any user if logged from anycomputer

28.In case of network disconnection, the system shall automatically resume the imagedisplayon reconnection

29.Systemshalldisplaythecompleteimageavailableatthatmomentincaseofnetworkdisruption ordisconnection.

30.Any user preferences like keyboard shortcuts, worklist columns once setup by a user should be available if the user logs from any computer.

1.Main PACS Application/Database

31.The system shall support the creation of individual users each having individuallyconfigurable access-privileges

32. The system shall provide an access control mechanism that enables assignment ofuniqueaccessprivilegestoindividualuserstoaccessoraltersystemresourcesanddat

a. Examplesofsuchfunctionsare:
b. Displayingapproved reports
c. Displayingunapproved(unsigned)reports
d. Displayingimages
e. Printingimages
f. Burning CD/DVD’s
g. Changingthestatusofimagesandexams
h. Changingthedisplayattributesofexams

33. Approving reports.

34.Creating, modifying, or deleting studies

35.Display status of studies.

36. The database should also support a direct DICOM Query/Retrieve interface, such

ascouldbeusedfor3rd partyworkstationsormodalityretrievals,withoutnoticeableperformancedegradation.

37.A system-wide administration function shall be provided to facilitate user profilecreation, worklist query creation, system configuration management, data integrity checksand maintenance, and any other administration functions as required by the implementationof the product. A graphical user interface for this function is required. In particular, patientmergeandsplit,aswellas exam merge and splitfeaturesshallbe provided.

38.ThesystemshallimplementthefollowingminimumDICOMSOPClasses

a. DICOMStorage
b. DICOMVerification
c. DICOMPrint
d. DICOMQ/R
e. DICOMSend

f.Image Archive

39. Archive should store 10 years data and must retrieve automatically without manual intervention.

40. ShouldbeVendorNeutralArchive (VNA)/VendorNeutralConnectivity(VNC)

1. 41. The system shall not store any image in the storage system with non- reversible compression.

1. (Lossy compression)

42. The system shallmakeexamsavailable for retrievalbyworkstations.

43. Thestoragesystemshalltoleratethefailureofasingledisk drive withoutlossofdata.

44.The storage system shall remain operational in the event of the failure of a single diskdrive.

45. The toragesystemshallremainoperationalduringtheservicerequiredtocorrectafaileddisk drive.

46.The storage system shall support the storage and retrieval of all SOP classes needed toaccommodatethepresentmodalities.ItshallsupportExplicitaswellasImplicitValueRepresentationaspart of itsSyntaxandstoreExplicitVRasitsdefaulttransfer syntax.

47.The system shall provide a DICOM interface to which DICOM- compliant externaldevices may connect. External devices are devices not supplied with the system and includebutarenotlimitedtoimagereviewworkstations,imageprintersand modalities.

48.The system shall include a DICOM Query/Retrieve SCP which is based on the Patientand Study Root Information model and which provides query responses for all studies, series,andimages stored in eithertheStorageSystem and/orthe Archive System.

49.Thesystemshall include aDICOMModalityWorklistManagementSCP.

50.The system shall include a DICOM Storage Commitment SCP which accepts storagecommitmentbythe modalities.

51.The bidder shall provide with the proposal the Conformance Statements covering allDICOMservices of thesystemforeachindividual component.

52.The external DICOM interface shall support storage of ultrasound images using theUltrasoundStorageSOP Class.

53.ThesystemshallprovideDICOMSupportforultrasound&cathlabcineloops.

54.The system should support unlimited US and Echo DICOM structured report

55.Imagelibraryfunctionforresearchandmarkinginterestingcasesmustbe available.

56.Teleradiology&Telecardiology module for accessing images and reporting from remote locations should be available

1.Image Viewing Stations

a. ClinicalReviewworkstations(CRWS)primarilylocatedinall Wards, OPD, MedicalSuperintendentOffice,Medical Director forreviewingpurposes.
b. Clients willrequirestandardsquaremonitorsforall stations.

1.User Interface

1. The cursor shall move within and between monitors in a smooth and continuous mannerunder the control of a mouse or trackball pointing device with the cursor remaining visibleduringitsmovement.
2. Thesystemshallenablealluserstocreatetheirownprofilesaccessiblefromanyworkstationwhich specifies at a minimum:

1. Windowwidthandlevelpresets
2. Defaultdisplayprotocols
3. MouseSettings
4. WorklistColumnsasperchoice
5. ElectronicSignature
6. AutoRefreshtimeforWorklist
7. Sizeof Worklist.
8. Dynamic patient work list creation.
9. The system shall provide the capability to access user specific hanging protocols from each workstation. These hanging protocols should be created through a user-friendly GUI which would allow a user to edit the default protocols and/or generate them from scratch. These hanging protocols will be modality and body-part specific.
   b.The system shall provide a mechanism for automatic logoff of a user at a workstation after a configurable period of workstation inactivity.

1.Exams, Folders, Worklists, and Queries

59. Thesystemshallallowdynamicallyupdatedworkliststobecreatedbythesystemadministrator for a specific user. For the purpose of this tender, a worklist is any databasequery, which returns a list of exams or patients. Dynamically updating means that as examschangestatusinsuchawayasto changethecontentsof aworklist, theworklistis automatically refreshed within aspecifictime.Therequirementfordynamicupdatingcanbe satisfied by periodic polling of the database with a frequency defined by a parameterwhichis configurable bythe system administrator.

61. A worklist entry for an exam shall include at least the patient’s name and ID, examinationprocedure, exam date and time, report status, modality, number of images, referring doctor,age&sex.

62. Thesystemshallsupportworklistwhichdisplaya list ofexamsbasedonqueries of:

1. Patientname
2. PatientID
3. Accessionnumber
4. modality
5. reportstatus
6. studydate
7. Betweenarangeofdates
8. Markedstudies
9. AEtitle
10. Institutionname
11. Done by
12. Reported by

b.Worklists shall be generated and stored centrally to the PACS network so that a user,logged on to any workstation, may access any worklist from the network and display examsselectedfrom this worklist to his/hercurrent workstation location.

c.Worklist should be customizable for each user and allow the user to display their own setofcolumns. Usershouldalsobe able to set uphispagesizeanddualmonitor support.

dThe workstation shall allow the user, with a single click, to sort the studies on any of the columns displayed in the Worklist.

e. Offered system should utilize a data locking methodology, if several concurrent usersaccess images i.e. Concurrent users will get reading access to images & no reporting exceptbythe 1st user is allowed.

f. Allexamsshallbeaccessiblefromeveryworkstation,limitedonlybysecuritymechanisms.

g.Old exams should be automatically displayed in the image viewer along with history & report. User should be able to load up to 4 priors of any modality for comparison

h. A mechanism shall be provided to permit a user with proper privileges to select images or exams for inclusion into one or more manually-created folders for teaching and research purposes.

i. It shall provide a mechanism to lock a study to prevent deletion of that study by another user.

j.It shall provide a mechanism to attach a message from one user to another to every study.

k.The Worklist shall display STAT request by easily identifiable color codes.

l. Should be possible to merge 2 studies together.

m.Should be possible to split a study into two.

n.Should support scanning of paper/reports and conversion to DICOM series.

o.The Worklist shall display the studies which have been locked or printed with some indication.

p. It should be possible to add a keyword to a study and then search & retrieve a list of studies based on that keyword.

q. It should be possible to search report content for any user definable keyword and get a list of reports with such keywords.

62.Reports

a. Reporting module should be fully web based. No 3rd party application like MS word should be used.
b. Theworkstation shall allowcreationofreportsbasedonuserselectabletemplates.
c. Theworkstationshallallowpre-configured header/footerinthereport.
d. Auto report selection as per the procedure.
e. The report window shall be opened separately and multiple such windows can be opened. Only the active study should be editable.
f. Thereportshallallow insertion ofkeyimagesforprintinginuserselectableformat.
g. The report shall automatically display the patient demographics from the DICOMheader.
h. Theworkstationshallallowauserwiththeproperprivilegestodisplaythereportforanyreportedexam without requiringthedisplayofitsassociated images.
i. Theadministrativestatusofanyreport(e.g.,approvedornotapproved)shallbeindicatedwhen thereportis displayed.
j. Thesystemshallallowcreationofmultipletemplatesaccordingto user/modality/organ.
k. Thesystemshallsupportcaptureandattachmentofaudiofilebytheradiologistuserforreporting.
l. The system shall allow the transcriptionist to review the audio and transcribe the report and submit it for approval of the radiologist.
m. The report shall support all standard formatting functions available in MS Word.
n. Report text search engine should be available.
o. PACS should support email/SMS/WhatsApp of reports automatically on finalization.
p. PACS should support speech recognition using dragon software or Augnito.
q. Reporting module should not use any 3rd party product like MS word, Report editor should support medical dictionary, Spell check, auto text and short cuts
r. Should support report link along with dicom image link share / send via SMS, email and WhatsApp
s. Should support Configurable number of times the report edit option
t. Should support -Reasons for Report Edits done every time
u. Should have * "PROVISIONAL Report" as water mark for emergency report
v. Should have Report tagging of multiple studies of same patient

1.J. Exam Display, Arrangement and Image Processing

a. The workstation shall support the display of multiple images from one exam on one ormoremonitors.
b. It shall be possible to choose among multiple image display formats for the monitors of aworkstation,forexample1:1, 2:1, 3:1, 4:1, 6:1, 9:1, 16:1, 20:1and 24:1.
c. The system shall provide user-selectable, user-definable protocols fordisplay of theimages of an exam where the protocols are specific to the type of exam. The intent of thisrequirementistoallow physicians' preferencesfordisplaytobe satisfied.
d. The workstation shall allow a user with the proper privileges to save the information thatcontrols the display of the images of an exam, including window width and level, displaysequence,orientation, magnification, pan position, and anyannotations.
e. Theworkstationshallsupportthedisplayofmultipleexamssimultaneously.
f. The system shall provide for display of multiple exams of a patient. The intent of thisrequirement is to support the presentation of historical studies along with a new study fordiagnosis.
g. The system shall support rapidly moving to the next or previous series/image in aWorklistusingthe equivalent of onekeystroke.
h. The workstation shall have the capability to display CT and MRI scout images with theslicepositionlinesoverlaidontheimage.Usershallhavetheoptionofdisplayingalllinesoronly1 linespecifictooneimage.
i. Rapid sequential paging through images of an exam displayable on a single monitor shallbeprovided.
j. Shoulddisplayindicationoffinalized studies.
k. Shouldbepossibletogivekeywords to anyimagesand search on thoselater.
l. If multiple image series are viewed, it shall be possible to page through the seriesindependently.
m. The workstation shall support arranging groups of images into a stack (with only thetopimagevisible) and displayingthemsequentiallyforwardorbackward.
n. The workstation shall support Thumbnail view providing a quick glance at the serieswithinastudy.
o. TheworkstationshallsupportimagedisplaybasedonAcquisitiontime,TablepositionandInstancenumberof CT images.
p. The workstation shall support linking two or three image stacks and moving throughthem synchronously sothat the same anatomicposition or imagesequencepositionisdisplayedin each stack.
q. The Workstation shall provide for full screen image display and paging in this fullscreenwindow.
r. A cine function with a user selectable, variable frame rate of at least 1 to 30 framespersecond shall beprovided.
s. The cine function shall support user selectable continuous display, reverse playingandtruesizedisplayof images.
t. The user shall be able to extract frames from the cine file and save it as an individualimage.
u. The workstation shall display all images of a cine file in user selectable displayformatin one keystroke/mouseclick.
v. The workstation shall provide dynamic window width and level through the entireimage grayscale dataset.
w. The window width and level function shall be applicable to a single image, selectedimagesor all images.
x. Windowwidthandlevelvaluesshallbedisplayedontheimageinrealtime.
y. Displayoftheinversegrayscale of anyimageshallbesupported.
z. Thesystemshallprovideunlimiteduser-configurablewindowwidthandleveldefaultsfor each user.

aa. Windowwidthandleveldefaultsshallbeuser-, modality-and organ-specific

bb. A rapid method to select among default window width and level values shall beprovided. The intent of this requirement is to allow the user to jump between, for example,bonewindows and soft tissue windows in CT usingfunction keys.

cc. If an image is received from a modality along with a window width and level forviewing, the window width and level parameters shall be used for the initial display on theworkstation.

dd. If an image is displayed for which no window width and level is available, theworkstation shall select a set of values, which at least make the image visible as a startingpointforsubsequent manual changes.

ee. Abilityto load different studiesof different patients, sidebyside for comparison.

ff. Systemshouldprovideaquickfilterfunctionforoneclicksearchofstudies(Weekly,Daily, Monthly). User defined filter function should be available

gg. Pre-definedmodality-specificdisplaylayouts.

hh The workstation shall allow the user to convert image/series/study from DICOM to JPEG/BMP format for local storage according to user rights.

ii. DSA Module is required forCathlabimages. Tool should include subtract and non-subtract angiography sequence

jj. PACS Should support Nuclear Medicine Image Viewing along with following features

64. CT-PET Fusion

65. SUV Values

66.MR PET fusion

a.K. Image Orientation, Zoom, Pan, and Magnifying Glass

67.The workstation shall allow sequential 90 degree clockwise and counter-clockwise rotation of any image as well as flip in the horizontal and vertical axes.

68.The workstation shall support angular rotation to any degree.

69.It shall be possible to reorient a single image, selected images, or all images in one operation.

70.The workstation shall be capable of enlarging an image by interpolation of pixel values.

71.Itshallbepossibletozoomasingleimage,selectedimages,orallimagesinoneoperation.

72.Zoomedimagesshallberepositionablebypanning(roaming)theimagewithintheareaallocatedfor displayof the image. Percentage of zoom shall be displayed.

73.When the actual image size is greater than the monitor resolution or there solution of the available display window, it shall bepossible to displaytheimageinTruesize.

74.Theworkstationshallincludeamagnifyingglass function.

75.Itshouldbepossibletoinvert, reverse,flipanimageorimages

a.L. Region of Interest, Distance, and Angle Measurements

76Theworkstationshallcomputepoint-to-pointmeasurementswithautomaticallycalibrated,user-selectablescales (micrometers, mm,cm, orinches).

77.The workstation shall support angle measurement.

78.The workstation shall support region of interest mean (in image units,e.g.,HounsfieldunitsforCT)andareameasurementbasedon ellipses andrectangulartracing.

79.TheWorkstationshallprovideatooltocomputeCobbsAngle.

80.TheWorkstationshallprovideProtractorandCrossProductcalculationtools.

81.Thetoolsshouldhaveuserdefinablecolorandlinesettings.

82.Theworkstationshallallowcropping/maskingofimageusingellipseor rectangle.

83.Theworkstationshallallowtheusertoselectaregionofinterestandmoveittoanotherpartof theimageforhighlightingapathology.

84.Theworkstationshallallowautomaticedgedetectioninan image.

85.TheWorkstation shall provide atooltocompute CT Ratio.

86.Volume measurement should be possible.

87.Curved length measurement should be possible.

a.M. Image Annotation

88. The workstation shall provide tools allowing the user to position and orient multipleinstances of text and graphics (lines, arrowheads, rectangle, freehand and circles) for imageannotation.

89.The Workstation shall provide tool for automatic labeling of intervertebral space andvertebrae(SpineLabeling).

90.Itshallbepossibletoeditordeletetheannotationsifrequiredatalaterdate.

91.Itshallbepossibletoprinttheannotationsonfilmifrequired.

92.It shall be possible to change the color, size and font of the annotations and set them asdefault.

a.N. Image Identification

93 The workstation shall display along with each image at least the following patient data,whereappropriatefortheimageand modality:

1. Patientname
2. PatientID
3. Examdateand time
4. Imageorientation
5. kVp
6. mAs
7. pulsesequence
8. sliceposition
9. imageorslicenumber
10. referringphysician
11. InstitutionName
12. EquipmentModel

94. All the above shall have configurable position for display on any corner ofimageandusercan set it in default position.

95.The workstation shall allow the user to toggle the display of image identification text on and off or it shall provide facility to mask all or any one of the display.

96.The workstation shall provide a function to display the entire contents of the DICOMheaderforaselected image.

97. .O. Utility Functions

a. Duringtheexecutionofatime-consumingfunction,theworkstationshallindicatethatthesystem is working.
b. Theworkstationshallprovideafunctiontoallowtheusertoprotectselectedimagesfromdeletion.
c. Theworkstationshallprovideafunctiontoallowtheusertomarkinterestingstudiesandsearchthem.
d. Shouldsupportauser-friendlyadminuserinterface.
e. Usercreationanddifferentrightsassignmentshouldbeavailable.
f. RemoteadministrationofworkplacesandPACSserversshouldbepossible.
g. Shouldbepossibletostoretheclientconfigurationdatacentrally.
h. IT Dashboard which provides information of major activities like number of users loggedin,studystatus, DICOMServices status should be available.
i. Configurable color codes for study status
j. POP – UP messages if study is been opened by another user
k. StatisticalreportsmustbepossibletobeproducedbasedondifferentcriterionlikeTAT,Studyvolumes,radiologist TAT, CD Written, Films printed etc.
l. Should support modality specific TAT. Color code should change if it goes beyond TAT
m. ShouldbepossibletoexporttheMISreportstoMSExcel.
n. Systemshouldsupportroaminguserprofiles(Afterlogon,theuser-specificsettingsareloaded independentlyon the workplace).
o. Settingsshouldbesavedinacentral repository.
p. Shoulddefineusergroupsaccordingtothedepartmentalstructures
q. Useradministrationpossibleshouldbewithoutprogrammingskills
r. Shouldprovidecompleteaudittrailofactivitiesinthesystem.
s. .P. Zero Foot Print Viewer (ZFPV) – Un limited license -
t. ZFPV should support all 2D processing tools,
u. DICOM image export, MIP & MPR
    a. reporting module
v. Volume Rendering Technique.
w. Q. Radiology Imaging System (RIS) Features

1. Patient registration module with ability to create study orders and forward them to the Modality using DICOM MWL.
2. Scheduling of patient appointments is required.
3. Usersshouldbeabletocreatemultiplestudyordersandscheduletheordersfordifferentmodalities.
4. UsersshouldbeabletomarkpatientsundervariouscategorieslikeMLC,HIVetcandgenerateareportofsuchpatients.
5. Usersshouldbeabletoadd Contrast information foranystudy.
6. Usersshouldbeabletoaddchargesforanystudyandgenerateinvoice&collectionreports
7. Usersshouldbeabletogeneratestatisticalreports.
8. Shouldbeabletoprint/scanpatientconsentformsforvariousstudies.
9. UsersshouldbeabletoscanattachpriorreportsasDICOMfiles.
10. Worklistshoulddisplaythe status of thestudyinreal time.
11. Should support Reconciliation Module's in case of wrong study done with different patient
12. There should be facility to request study both online and offline with facility to scan the offline request

a. <u>Basic 3D Work station with following features – 20 Nos</u>

1.Basic 3D processing like MPR / MIP / mIP / AIP/Curved MPR, VR, 3D should be possible directly at the reporting workstation without additional application changing.

98. Following additional 3D features are required on each station in the radiology department for concurrent use.

99.Should work on Windows OS or similar.

100.Multiplanar Reformat (MPR).

101.MIP/AIP/MinIP.

102.Curved Planar Reformat (CPR).

103.Medial Axial Reformat.

104.Oblique/Double Oblique.

105. SSD.

106.Volume Rendering (VR).

107.Auto Bone removal.

108.Table & Gantry Removal.

109.Volume Sculpting.

110.Volume Measurement.

111.Flythrough and Virtual Endoscopy with (viewing the inner surfaces of cavities in tissues) automatically and manually navigate the inside a cavity build cavity surfaces, view scale down multi planar reconstruction of the series simultaneously (with automatic synchronization).

112.remove bone tissue for Dual Scan and Dual Energy studies.

113.3D Clipping.

114.3D Cursor.

115.Whole Spine Auto Stitching.

116.Vessel Analysis including complete automatic segmentation & workflow for each body part like (Neck angio, Cerebral, Coronary, Abdomen etc).

117.CT - Angio Segmentation and volumetric Measurement.

118.Film Print / Paper Print.

119.CD/DVD/ Flashcard Writing.

120.Dental panoramic mode.

121.DSA.

122.PET_CT Fusion module including SUV Measurement

123. MRI Perfusion

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a. 28 Tractography
b. 29 Fiber Tracking
c. 30 FiberColor& Scalar Maps
d. 31 Fractional Anisotropy (FA); with Mean Diffusivity (MD), Axial Diffusivity (AD), Radial Diffusivity (RD).
e. 32 Fetal Medicine Calculators
f. 33Anonymize studies and series & etc.

Advance 3D Visualization with following features – (Vendor should supply required server hardware as well)

Si No	Feature	License
1	Stroke Analysis	2Concurrent user licenses
2	Oncology Quantification software Including RESIST & WHO	2 Concurrent user licenses
3	PET Lesion management Software Including RESIST, WHO & Functional PERCIST	2 Concurrent user licenses
4	Virtual Colonoscopy Software	2 Concurrent user licenses
5	Extract CT angio data from CT Perfusion Exams	2 Concurrent user licenses
6	MR tools for ADC, DTI, Spectroscopy and Fusion	2 Concurrent user licenses
7	MR Multi Parameter imaging for Brain	2 Concurrent user licenses
8	CT vessel analysis with automated real time tracking and labeling	2 Concurrent user licenses
9	MR tools for vessel assessment	2 Concurrent user licenses
10	Cardiac anatomical functions and perfusion information	2 Concurrent user licenses
11	CT Perfusion for complete perfusion assessment for Multiple Organ	2 Concurrent user licenses
12	CT perfusion for complete perfusion assessment for Brain	2 Concurrent user licenses
13	Liver Volumetry software	2 Concurrent user licenses

Networking Related Job:

The Vendor must do the following network jobs in such a way that the transfer speeds are without any lag or data loss. The server room is expected to be in the Surgical block and disaster recovery room will be in the oncology block.

- Interbuilding Networking - The buildings mentioned in above page need to be linked using good quality optical fiber cable. The deployment and maintenance of the OFCs for a period of 10yrs shall be done by the PACS Vendor. These cables should be capable of transferring data from the modalities to the server and from the storage to individual buildings. All attempts should be made to integrate the PACS network to the existing network of each building or any future LAN networks which maybe established.
- Intrabuilding LAN Networking – The Vendor must set up secure LAN network with at least 10G speed in

- Surgical Block – 6 floors the detailed plan of which shall be provided on request.
- CTVS Block – Three floors, the detailed plan of which shall be provided on request
- Radiology department of emergency block – Two floors consisting of diagnostic and Interventional Radiology

- The backbone within the buildings should be OFC for high speed data tranfer

- Setting up a secure distribution network over the internet – where the images and reports of PACS can be visualized by the end-user who has login rights provided by the department of radiology. All measures should be taken to maintain the security of data.

PACS Software with Hardware,Networking Solution - BoM

SI	Item	Quantity
1	RIS PACS software with High Availability license	1
	Radiology diagnostics Viewer	Unlimited
2	Basic Radiology 3D software license	20
	Advance radiology 3D software license (As per the specification)	2
4	Unlimited viewing license (MPR/MIP/ Basic VR)	1
5	Unlimited mobile viewer	1
6	Unlimited SMS and Email alerts Module	1
7	Bi- Directional Integration with HIS	1
8	Connectivity to DICOM Modalities	Unlimited
9	Patient portal	Required
10	RT Support	Required
11	RIS User license	Unlimited
12	DICOM Modality work list license	Unlimited
13	Teleradiology license	Unlimited
14	Radiology work station license	20
15	Physician viewing license	Unlimited
16	MIP/MPR Licenses	Unlimited
17	Mammography Viewing license	5
18	Annual study volume license	Unlimited
19	Mobile /Tab Viewing license	Unlimited
20	Vendor Neutral Archive	Required
21	Peer Review Module	Required
22	Critical results Alert Module	Required
23	Image library & CME Module Licenses	Unlimited
24	Film printing & CD Writing Licenses	Unlimited
25	3rd Party Integration with HIS /LIS/EMR	Required
26	Implementation & Training	Onsite
27	Onsite Engineer- 1 person. B.E / B.Tech / MCA with 3 years relevant experience	3 Year
28	Speech recognition software with Radiology library	5
29	Warranty for all hardware and software	3 years
32	CMC for all hardware and software	4 years

Work Study is currently as follows

Sr.No	Modality Type	Modality Count	Daily Scan Volume	Total Study Volume
1	CT	1+2	150+50+30	230
2	PET CT	0+1	10	10
3	MRI	1+1	35+35	70
4	Xray	2+2	600+300+600	1500
5	USG	3+2	80+50	130
6	Cathlab	1+1	15+10	25
7	Mammogram	1+1	5+10	15
8	BMD / Dexa	0	0	0
9	ECG	0	0	0
10	DSA	1+1	15+5	20
11	Special/fluroscopy	0+1	10	10
12	Portables	12	100	100

A 10% increase in the workload is expected per year. The Vendor should calculate adequate storage for next 10 years.