

# Detailed Specifications and Standards

(Recommend by the Technical Working Group and submitted to the  
Ministry of Information Technology)

## 1. Standards

### 1.1. Infrastructure

#### 1.1.1. Hardware

##### 1.1.1.1.1. *Specifications for typical PC based TCC system configuration*

- 1.0 Ghz or above processor speed system or equivalent with appropriate mother board
- Appropriate number of Serial, parallel & USB ports.
- 10/100 Base-T LAN/Ethernet interface with Wake-On-LAN (WOL).
- Appropriate clinical device interfaces, ex. Interface for ECG and pathology camera
- 40 GB (minimum) or more HDD
- 1.44 MB FDD.
- 128 MB DD RAM, up-gradable to 1GB
- CD Writer, with 8X (minimum) re-write speed (recommended)
- Graphics with 32 MB (minimum) RAM & PAL-B composite (minimum) video output.
- 24-bit image capture hardware with image resolution of 720 x 576 (minimum) with appropriate video interface.
- High-resolution (1280 x 1024) 17" color monitor, for displaying medical data/images. Images is advisable. But 15" color monitor with 1024\*768 resolution can also be considered
- Audio interface with speakers, (20W minimum) & a microphone.
- Web camera (640~)\*(480~) Maximum resolution. Frame rate:30fps@VGA (640\*480);Optical system; CCD; Progressive 330K effective pixels
- Standard Windows 101 US Key board.
- Scroll two-button mouse with mouse pad.
- Preferred two spare PCI slots.
- Auto shutdown facility.

#### **Optional:**

- Video switching unit.
- ISDN interface up to 384 kbps.
- Specialized interface for clinical devices & communication:
- SCSI

- Camera Link
- IEEE 1394
- Blue tooth
- IEEE 802.11 (b)

#### 1.1.1.1.2. *Specifications for typical PC based TSC system configuration*

- Intel Pentium-IV, 1.8 GHz with Intel chipset mother board or AMD Athelon, 1.8 GHz or equivalent, with appropriate mother board
- Appropriate number of Serial, parallel & USB ports.
- 10/100 Base-T LAN/Ethernet interface with Wake-On-LAN (WOL).
- 40 GB (minimum) or more HDD, operating at 7200 rpm (minimum).
- 1.44 MB FDD.
- 256 MB DD RAM, upgradeable to 1GB.
- CD Writer, with 8X (minimum) re-write speed.
- Graphics with 32 MB (minimum) RAM & PAL-B composite (minimum) video output.
- 24bit image capture hardware with image resolution of 720 x 576 (minimum) with appropriate video interface.
- High-resolution (1280 x 1024) 17" color monitor, for displaying medical data/images. High-resolution (1280 x 1024) 17" color monitor, for displaying medical data/images is advisable. But 15" color monitor with 1024\*768 resolution can also be considered.
- Audio interface with speakers, (20W minimum) & a microphone.
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- Standard Windows 101 US Key board.
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#### **Optional:**

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- Specialized interface for clinical devices & communication:
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- Camera Link
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- Blue-tooth
- IEEE 802.11 (b)

### 1.1.1.1.3. *Dedicated Set-top-box*

- Printer (optional): TCC and/or TSC :
- Any standard printer for text/report purpose
- Image/graphics for reference purpose with appropriate specifications.
- Diagnostic quality image printers, please refer DICOM/FDA standards
- Video Conferencing Unit: Video conferencing facility is optional and is preferred in cases where the visual interaction between patient to doctor is relevant and it is compliment/supplement the diagnostic data.

## 1.2. Clinical devices:

The power requirements, computer interface requirements and environmental conditions are common and are as follows

- Power requirements: 230 V AC, 50 Hz
- Computer interface: serial port/parallel port/USB/SCSI/Ethernet with relevant and appropriate drivers
- Environmental conditions:
- Temperature: 10-35 Deg Celsius
- Humidity: 35%-70%

Specific requirements if any, are mentioned in the relevant sections.

Minimum configuration for Telemedicine diagnostic equipment is as follows:

### 1.2.1. *Digital ECG (12 LEAD MODULE)*

#### *Specifications:*

- Leads : Standard 12 Leads, with one long lead
- Freq. Response : 0.5 To 125 Hz
- Leakage Current : < 10 Micro amps
- CMRR : >100 DB
- Input Impedance : > 4 M Ohms
- Filter : To suppress supply frequency fluctuations
- A/D Conversion : 10 bit
- Sampling Rate : 500 Samples/seconds
- Recording Speed : 25/50 mm/sec.

Optional features in the PC interface software: Display and printing

### 1.2.2. *X-Ray Digitizer*

- Resolution : 1200 dpi/lpi (horizontal/vertical) \*
- Color resolution : 12-14 bits/channel(gray scale)

Active area : As per the application (commercially available A3 and A4 scanners can also be deployed)

Computer interface : Other than Rs-232

Backlighting optimized for X-ray application

\* Commercially available dedicated X-ray scanners of lesser dpi (at least 150 dpi) may also be considered, as appropriate

### 1.2.3. Ultrasound (Sonography machine)

Scanning Method : Electronic Convex, Micro convex and Linear Array

Imaging Modes : B, B/B, B/M, M

Electronic Array : 3.5 MHz, 5.0 MHz,

Probes : Linear convex, Trans- Vaginal (for Gynecology/obstetrics applications)

Display Frame Rate: 24-30 fps

Depth Selection : 4.5, 6, 9 12, 15, 18, 21CM, Scroll Function

Gray Scale : 64 shades of Gray, at least

Converter : 512x512x6 bits, at least

Measurements : Mouse/Trackball Operations

B-Mode : Distance, Area Ellipse

M-Mode : Heart Rate (optional)

Calculations : Fetal Parameters : BPD, HC, CRL, AC, FL, HI, GS, LV, TA as relevant

Image Management: Report : Patient and Measurements Summary Image

Computer interface: Using Image grabber/video capture card (PAL/NTSC/Composite video) /DICOM format output

### 1.2.4. Glucometer

Test : Glucose in capillary whole blood

Sampling size : 3  $\mu$ L of whole blood

Sampling : Blood is automatically drawn into the Sensor by capillary action

Measuring range : 1.1-33.3mmol/L (20-600mg/Dl)

Test principle : Electrochemical

Specificity : Sensor reacts specifically with  $\beta$ D-glucose

This Glucometer can be either hand-held and/or standalone

Optional : Computer interface

### 1.2.5. Portable X-ray machine

Generator : 1 Pulse, Half wave

Output (max) : 60mA-70kV- 0.4s;40MA-80kV-2.0s; 20mA-100kV-6.0s

- Line Resist : Max.0.4ohm
- KV : 45 to 100 kV, 5 kV per step
- Rad. Timer : 0.04 s to 6.0 s in multiple steps
- X-ray Tube : Focus 2.8 x 2.8 mm
- : Anode capacity40 KHU or equivalent
- Power Supply : Single Phase, AC,50Hz (in addition to general Supply)

**Suggested features**

- Easy Mobility and steering
- Integrated cassette box
- Easy transportation, in normal elevator and narrow passages

*1.2.6. Pulmonary Function Test (PFT) machine*

- Flow Measurement : Screen type Pneumotach
- Volume Measurement: Flow integration
- Flow Range : 15 L/Sec
- Volume Range : 0 – 8 L
- Flow Accuracy : + 5% of reading
- Volume Accuracy : + 3% of reading
- Frequency Response : 0 to 30 Hz.
- Sampling Rate : 128 samples/sec
- A/D Resolution : 12 bit
- Measuring Parameters: FVC, FEV 0.5, FEV1, FFV3, FFV1/FVC, FEV3/FVC,  
FEF25-75, FEF 25%, FEF-50%, FEF 75%, PEFR, FIVC, FIV1,  
FIV%, PIF, MVV.
- Computer interface : with Real time display of flow volume loops with online display  
of flow and volume v/s time

*1.2.7. Fetal Heart Rate monitor*

- KV : 45 to 100 kV, 5 kV per step
- Technique : Continuous Doppler with Auto Correlation
- Frequency : 2.5 MHz
- Intensity : < 10 mW/sq. cm
- HR Range : 30 to 240 BPM
- Uterine Contraction Range: 0-100 Units
- Bandwidth : 0-0.2 Hz
- Heart Rate(HR)            Uterine Activities (UA)
- Scaling : 30 bpm/cm            25 mmHg/cm

Range	: 30-240 bpm	
Resolution	: 1 bpm	1 m/Hg
Speed	: 1/3 cm/min	

### 1.2.8. *Tele-Pathology Microscope including Camera*

A compound microscope, digital camera for tele-pathology applications, microscope system with modular concept upgrade able to phase contrast, dark field contrast, fluorescence (optional), photomicrograph and analysis, Delta/infinity corrected optics.

Range	: 30-240 bpm
Optics	: Delta/infinity corrected with harmonic components
Nose-Piece	: 3 or more objectives
Objectives	: Standard achromatic objectives, oil with phase contrast, Magnification as per application, BF/DF observations
Eye Pieces	: 10X 22X with harmonic components optics
Illumination	: 12V, 30 W stabilized

### 1.2.9. *Trinocular tube*

Binocular with fixed photo tube/1X with 30 deg. viewing angle with inter-papillary distance adjustment from 55mm-75mm, with constant focus and beam splitter position vision/photo 50/50% fixed, condenser sub stage: universal condenser upgradeable for phase contrast dark field and bright field 0.90/1.25.

### 1.2.10. *Filter Magazine*

Built in the stand with day light filter, green & neutral density filter 16%. The filter changing level is near to X 1Y knob of the stage for agronomy field diaphragm built in stand.

### 1.2.11. *Camera*

Digital Camera system composed of a C-mount CCD camera 1/2" image sensor with RGB 3 prime color filter, resolution 2.1 mega pixel or better with a minimum illumination of 5 lux/F2.0 with an interface to the computer.

## 1.3. **Video-conferencing units**

- Software based desktop video-conferencing using web camera as an economical option when low bit rate channel less than 64 kbps are used.

### 1.3.1. Specifications – Video-conferencing-Stand-alone Type

### 1.3.1.1. Codec

Interoperability : Full ITU-T H.32x Standards-compliant (full forms to be added in legend)

H.320 for ISDN line\*

H.323 for LAN/Ethernet\*

H.324 for PSTN (POTS) line\*

Video Compression : H.261 (H.263 for

Standard H.324)

Video Resolution : QCIF – 128 X 96 (H.263)

QCIF – 176 x 144

FCIF – 352 x 288

Video Frame Rate : 15 - 25 fps

External Video : 2 color composite

Inputs CCIR PAL-B

Video interface : BNC or RCA

Display Mode : VGA and SVGA upto 1024 x 768, 24-bit color

Video Outputs : Minimum 1 color composite CCIR, PAL-B

Audio Compression Standard : G.711: 3.4 kHz @ 64 kbps

G.722: 7.1 kHz @ 48 / 56 / 64 kbps

G.723.1: 3.4 kHz @ 5.3 / 6.4 kbps (H.263)

G.728: 3.4 kHz @ 16 kbps

G.729: 3.4 kHz @ 8 kbps (H.263)

External audio input: 1 (desirable)

Audio Outputs : Minimum 1

Audio Performance : 100-7100 Hz frequency response

Full duplex

Automatic Gain Control

Automatic Noise Suppression

Acoustical echo cancellation

Signaling Standards : H.221, H.230, H.231, H.242

Data Rates : 64 kbps to 2048 kbps.

External Data : Compliant to ITU -T

Interface : T.120 std, (desirable)

Far End : H.281 compliant

\* As per network requirement.



**Optional:**

Automatic Noise Suppression

Acoustical echo cancellation

*1.3.2.1. Camera (With microphone)*

Data Rates : 64 kbps to 768 kbps.

Camera sensor : CCD

Picture resolution : 400 TV lines, minimum

Video output : Color composite CCIR PAL-B

Video interface : BNC or RCA

*1.3.3. Specifications – Video conferencing - Camera with built-in encoder type**1.3.3.1. Codec*

Interoperability : Full ITU-T H.323 Standards-compliant

Video Compression : H.261 and H.263 Standard

Video Resolution : QCIF – 176 x 144

FCIF – 352 x 288

Video Frame Rate : Up to 25 fps

Audio Compression : G.711: 3.4 kHz

Standard @ 64 kbps

G.722: 7.1 kHz @ 48 / 56 / 64 kbps

G.728: 3.4 kHz @ 16 kbps

Audio Performance : 100-7100 Hz frequency response

Full duplex

Data Rates : 64 kbps to 384/512 kbps

Camera sensor : CCD

Picture resolution : 400 TV lines, minimum

**Optional:**

Automatic Noise Suppression

Acoustical echo cancellation

*1.3.4. Specifications – Video conferencing – Software based web Camera*

Max.Resolution : 640(h)\*480(v)

Frame Rate : 30 fps @VGA (640\*480) 400 M-bits /sec. capable

Optical System : CCd

Progressive 330k effective pixels