



## Minimum AV Scope of Work

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3-1-2016

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**Supplemental documentation: Please see “Mt San Antonio College AV Specification Appendices”.**

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## **PART 1 - GENERAL**

### **1. SECTION INCLUDES:**

- 1.1.** General provisions of the Contract apply to this section. Reference AV drawings and equipment matrix for additional information.
- 1.2.** The work of this section also includes:
  - 1.2.1.** Required licenses, insurance and permits including payment of charges and fees
  - 1.2.2.** Verification of dimensions and conditions at the job site
  - 1.2.3.** Preparation of submittal information
  - 1.2.4.** Pick-up of Owner Furnished Equipment (OFE) and incorporation into project
  - 1.2.5.** Disposal of all equipment packaging in coordination with the project manager.
  - 1.2.6.** Development and implementation of AV control system software code and control panel layouts, which will become the property of the District.
  - 1.2.7.** Installation in accordance with the contract document, manufacturer's recommendation, and in conformity with applicable codes and authority having jurisdiction
  - 1.2.8.** Extension of electrical service, including ground, to equipment locations if required
  - 1.2.9.** Final tests and adjustments, written report, and documentation
  - 1.2.10.** Instruction of operating personnel
  - 1.2.11.** Provision of manuals
  - 1.2.12.** Maintenance services and warranty

### **2. RESPONSIBILITY**

- 2.1.** Provide all materials, equipment, transportation, and labor necessary to achieve a complete and functionally working system as shown or inferred on the Drawings and in the Specifications. Supply accessories and minor equipment items (such as, but not limited to: power strips, adapters, connectors, mounting hardware, etc.) needed for a complete system, even if not specifically mentioned in these Specifications or on the associated Drawings, without claim for additional payment.
- 2.2.** It is the responsibility of the Contractor to supply a full working, tested, and calibrated system. Notify the System Designer of any discrepancies in part numbers or quantities before bid. Failing to provide such notification, the Contractor shall supply items and quantities according to the intent of the Specification and Drawings, without claim for additional payment.
- 2.3.** Specifications and drawings are complementary. Work called for by one is binding as if called for by both. Any discrepancies between specifications and drawings shall be brought to the attention of the System Designer for clarification during the bidding period. No allowance shall subsequently be

made to the Contractor by reason of his failure to have brought said discrepancies to the attention of the Architect.

- 2.4. Execute all work in accordance with the National Electrical Code (NEC), the National Electrical Safety Code, the Occupational Safety and Health Act (OSHA) and all applicable State and Local codes, ordinances, and regulations. If a conflict develops between the contract documents and the appropriate codes and is reported to the System Designer prior to bid opening, the System Designer will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval, perform Work.

### **3. QUALIFICATIONS**

- 3.1. The AV contractor shall have on staff an On Site Project Manager possessing a CTS certification from InfoComm with at least 5 years of installation experience assigned to this project. This project manager must be a full-time employee of the A/V contractor. The A/V contractor shall supply with their bid a copy of the CTS certificate of the Project Manager assigned to this project.
- 3.2. The AV contractor shall have a control system programmer on full time staff and be assign to this project. The assigned programmer must attend an on-site "Programming" meeting at the beginning of the project to discuss the operation and layout of each system. A preliminary user interface layout shall be presented to the College prior to the installation. During start up, once the equipment checks out for manual controllability, the assigned programmer shall be scheduled for on-site testing. The programmer shall remain scheduled until the system is completely operational and the client's Representative has approved all functionality. This programmer shall, at a minimum, have an Extron ECP and XTP Certification. The A/V contractor shall supply with their bid a copy of the programmer's certificate of completion.
- 3.3. If applicable, the AV Contractor shall have an audio specialist on staff who is a BSS Soundweb London Level 1 & Level 2 certified audio programmer as well as Harman Audio Architect certified for this project and supply with their bid, a copy of their certification.

### **4. RELATED WORK**

- 4.1. Submittals.
- 4.2. Electrical Work.
  - 4.2.1. Conduit, wireways, floor boxes, wall boxes, pull boxes, junction boxes, AC power circuits and ground wiring.
- 4.3. Structural Installation

- 4.3.1. Projector Ceiling box and Projector screens to include "all-thread" and sway bracing support.
- 4.3.2. Interactive White Board and wall mounted projector shall be secured to studs in wall. Drywall anchors will not be accepted.

**5. DEFINITIONS**

5.1. The following list of terms as used in these specifications shall be defined as follows:

- 5.1.1. "AV Contractor" is the specialized contractor and/or programmer.
- 5.1.2. "System Designer" or "Designer" is the AV system designer employed by Mt San Antonio College.
- 5.1.3. The "District" refers to Mt San Antonio College and it's employees.
- 5.1.4. "Furnish" is to purchase, procure, acquire, and deliver complete with related accessories.
- 5.1.5. "Install" is to set in place, join, attach, link, set up or otherwise connect together and test until complete before turning over to the Owner, all parts, items, or equipment supplied by Contractor.
- 5.1.6. "Provide" is to furnish and install.
- 5.1.7. "EC" is the electrical contractor or awarded the building construction contract for the purpose of new and refurbishing buildings. In the case where there is only an AV contract for renovation of the AV system, it is the responsibility of the AV contractor to complete the AV installation including but not limited to speakers, projector mounts, and projector screens.

**6. WARRANTY**

6.1. The contractor shall provide parts and labor at no additional cost to the District for any issues that arise from defective parts or workmanship provided by the contractor for the scope of work as defined in the project contract for a period of 2 years. The warranty period will begin once the contractor has turned over to the District all documentation, design files, and programming for the installed equipment.

**7. PRODUCTS**

7.1. Refer to appendix document.

**Part 2 - INSTALLATION**

**8. Physical Installation**

**8.1. Summary**

8.1.1. As part of the base building project contract, any equipment that touches the finished ceiling shall be installed by the EC. Also, floor boxes and/or wall boxes, CAT6 network infrastructure, power, and mounts for wall mounted equipment will be installed prior to the AV

installation phase. If there is no EC, then this work shall be completed by the AV Contractor. If there are no cable pathways prior to the AV Installation phase, the AV Contractor shall provide a submittal for the proposed pathway to be installed. It is the responsibility of the AV contractor to make power and network connections available and to connect all AV equipment at all floor/wall box, projector locations, speakers, cameras, and network closet. AV network CAT6 patch cables shall be purple and instructional CAT6 patch cables shall be blue.

#### **8.1.2. Terminations**

- 8.1.2.1.** Use crimping tools recommended by the termination or connector manufacturer.
- 8.1.2.2.** Provide insulated spade lugs for screw terminals, two lugs per terminal maximum.
- 8.1.2.3.** Use properly sized spade lugs for cable gauge and screw size.
- 8.1.2.4.** Conductors terminated in phoenix type connectors shall not be tinned.
- 8.1.2.5.** Ferrules in phoenix connectors shall not be used.
- 8.1.2.6.** Audio shield/drain wires shall not be connected to the connector body at any time.
- 8.1.2.7.** When the shield/drain wire is exposed outside of a connector, an insulating tube shall be placed around the drain/shield and the insulating jacket shall have heat shrink.
- 8.1.2.8.** If multiple connections types are available on a piece of equipment, the screw type terminal (or phoenix connector) shall be used first, followed by an XLR connector.
- 8.1.2.9.** Neutrik Speakon connectors shall be used for speaker connections at the wall/floor box.
- 8.1.2.10.** Maintain proper and consistent polarity across all equipment including communication lines, audio lines, and speakers.
- 8.1.2.11.** Use only true 75 ohm BNC cable end connectors designed for the intended coaxial cable. Apply connector with a crimp die certified to be used with the intended coaxial cable and BNC. Feed throughs must strictly maintain 75 ohms.
- 8.1.2.12.** For HD-SDI (3G-SDI), do not use any connectors or feed throughs not specifically rated for 3Ghz digital bit rate.
- 8.1.2.13.** All male shielded RJ45 termination shall have a boot.

#### **8.1.3. Labeling**

- 8.1.3.1.** Handwritten labels are not acceptable
- 8.1.3.2.** Provide self-adhesive labels to aid the end user in the use of equipment as necessary. I.E. label teaching lectern monitors "Computer" and "Projector" accordingly, label display port cable to laptop connection "Laptop Display Port", VGA cable to laptop connection "Laptop VGA", etc.
- 8.1.3.3.** For installed wiring, provide labels using the wire numbers as shown in the wiring schematics.
- 8.1.3.4.** Wire labels shall be self-adhesive label under clear heat shrink, direct printed heat shrink, or direct printed, self adhesive, self laminating.
- 8.1.3.5.** Provide labels on both ends of the cable
- 8.1.3.6.** Provide labels on cable greater than 3 feet long unless otherwise specified.

## **8.2. General purpose classrooms (less than 50 capacity)**

- 8.2.1.** Unless otherwise specified, rack mounted equipment shall be installed in the teaching lectern and connect to the room AV system via a floor box or a wall box. Refer to system drawings for cables and connectors as needed.
  - 8.2.1.1.** Connections to the floor/wall box include but are not limited to power, one (1) purple shielded CAT6 for the projector, one (1) 16 awg speaker cable, one (1) purple CAT6 cable, and two (2) blue CAT6.
  - 8.2.1.2.** A covered box shall be mounted in the surface of the lectern and provide the user access to power, USB power, HDMI on retractor, Mini Display Port on retractor, Display Port on retractor, VGA on retractor, Network CAT6 on retractor, and 3.5mm audio on retractor.

## **8.3. Digital signage**

- 8.3.1.** Connections to the wall box include but are not limited to power, one (1) shielded CAT6 to the network closet, and one (1) purple CAT6 cable to the network closet.

## **8.4. Conference Rooms**

- 8.4.1.** Includes a table mounted box containing a touch panel, 120v power, USB power, one (1) HDMI with retractor assembly, one (1) VGA with audio with retractor assembly, one (1) blue CAT6 with retractor assembly. Unless otherwise specified, the controller and switcher shall be mounted under table within center table leg structure.



**8.4.2.** Connections to the floor/wall box include but are not limited to power, one (1) purple shielded CAT6 for the projector, two (2) purple CAT6 cable, one (1) blue CAT6, and one (1) cable for motorized screen control.

**8.4.3.** Projector mount shall be a Plenum rated ceiling box to hold video receiver and speaker amplifier. Ceiling box model shall be minimum equivalent Middle Atlantic ECB-RLINK with network power control.

**8.5. Office AV systems**

**8.5.1.** Includes a table mounted box containing a touch panel, 120v power, USB power, one (1) HDMI with retractor assembly, one (1) VGA with audio with retractor assembly, one (1) CAT6 with retractor assembly. Unless otherwise specified, the controller and switcher shall be mounted under table.

**8.5.2.** Connections to the floor/wall box include but are not limited to power, one (1) purple shielded CAT6 for the projector, two (2) purple CAT6 cable, one (1) blue CAT6.

**8.5.3.** The display shall be a 40"-55" Video monitor.

**8.6. Specialty Rooms or Auditoriums**

**8.6.1.** Based on the system for general purpose classrooms includes but not limited to rooms with special use or considerations such as divisible rooms, rooms with tiered seating, video conference or teleconference, demonstration rooms, rooms with multiple displays,

**8.6.2.** Please refer to design plans for additional information.

**8.7. Inspections**

**8.7.1.** Any equipment that is permanently mounted to the physical structure (including the hanging of projector, screens, or wall mounted projectors/TV's) require inspection in all cases which are supported by stamped structural drawings. No work may be done in ceiling spaces without asbestos clearances.

**Part 3 - Programming**

**9. Programming Overview**

**9.1.** The College uses a centrally managed server, Global Viewer Enterprise (GVE) by Extron to manage all AV systems on the campus. All Extron components will have the ability to connect to GVE. All control programming in Extron units shall have programming to link their controls to GVE. It is the responsibility of the contractor that all available controls are made accessible through GVE.

**9.2.** The Campus uses a centrally managed server to observe the status of all connected projectors with Epson EMP monitor. The contractor shall install

the projector with the appropriate user name and password as well as setting the network information and storing the campus logo on the projector in accordance with campus standards. The logo shall be made available to the contractor by the District.

- 9.3.** The College has a layer 3 (Class A) network. It is the contractor's responsibility to assign addresses to devices in accordance to the campus standard network protocol. No DHCP server will be available. The contractor shall also document the MAC addresses, serial numbers of the equipment, and the College asset tag.
  - 9.3.1.** The contractor shall be provided with a spreadsheet providing the IP address, subnet mask, router/gateway address, DNS address, and email target address.
  - 9.3.2.** This spreadsheet will have blank columns to enter the required equipment information.
- 9.4.** All programming is property of the College and shall be made available at any time during the development/programming phase. Upon completion of the project, the programming shall be immediately made available to the College in complete form. The College shall provide the Contractor with the user-name and passwords for all devices regarding this project.

## **10. Naming Conventions**

- 10.1.** The purpose of this naming convention is to organize all AV system on the Campus for file management and ingestion into Global Viewer Enterprise. There are four locations where the naming convention must be used within a project file: the controller, the Communication Ports (devices within the project), User Interfaces (touch panel), and the GlobalViewer Editor.
  - 10.1.1.** The controllers within the design file will be named according to their location and IP address, "Building#" – "Room#" : "IP address". Building numbers shall be a two digits number and a letter if applicable and room numbers shall be a 4 digit number with a letter if applicable. Rooms fewer than 4 digits shall have preceding 0's. For example "26A-3470: 10.1.10.11", and "06-0131: 10.38.10.11".
  - 10.1.2.** The "Communication Ports" contain the devices that are controlled by the system. These include, but are not limited to, projectors, televisions, switchers, audio processors, cameras, etc. Projectors within the design file shall be abbreviated "PJ" with the make and model number. Televisions shall be abbreviated "TV" with the make and model number. For rooms with multiple displays of the same type (i.e. two projectors and/or two TV's) cardinal directions shall be used for the displayed surface. If there are multiple displays on the

same surface, they shall be labeled in sequential order while facing the display surface. For example "PJ, Epson 1985WU", "TV South, Sharp PNE70", "PJ North1, Epson 1985WU", "PJ North2, Epson 1985WU". Other controlled equipment shall be labeled by the manufacturer and model number with its location. For example "Extron IN1608 - Lectern", "Extron XTP T USW - Floorbox".

**10.1.3.** The User Interfaces, or touch panels, shall be named according to the model name with a location identifier. For example, "TLP Pro 720M - Lectern", "TLP Pro 720C - Advisor", "TLP Pro 1220M - Lectern".

**10.1.4.** The GlobalViewer Editor shall be organized by building, then floor, then room. For example, "Building 26A" – "Floor 1" – "Room 0201".

**11. Graphical User Interface ("GUI") and Machine Control (see Appendix document for Examples):**

**11.1.** The Project will be completed in five phases.

**11.1.1.** During the first phase, development of the GUI panel layouts and machine functions are to be established and sent to the College for review and approval. A template shall be provided to the contractor by the District.

**11.1.2.** Upon approval of phase one, the Control System Programmer produces the initial GUI and machine software control filling the requirements developed during the first phase.

**11.1.3.** Upon completion of the second phase, install the control software within the AV Control Systems and inspect the systems for performance compliance. During this process the Programmer with the assistance of the Installer debugs the AV Control Systems software code as required to ensure a properly functioning system.

**11.1.4.** During the fourth phase, the Programmer, the Installer, and the College inspect the operational aspects of the Systems and develop final software configurations. Upon completion of final configuration, the Installer and the Programmer installs and debugs the final Control Systems software code as required to ensure a properly functioning system as established during the fourth phase.

**11.1.5.** The fifth phase is a period of one month where the end user interacts with the "GUI" and determines that the programming is appropriate and intuitive for them to use. At the end of the one month period, the Control Systems Programmer will apply necessary changes that are within the scope of the system design.

## **11.2. Required Pages**

- 11.2.1.** Start page with Campus standard logo.
- 11.2.2.** In the event the system can be used without the projection system i.e. conference system or teleconference, a projector option page will show after the start page.
- 11.2.3.** Touch panel disconnect page.
- 11.2.4.** System Connection Status page showing the status of the connected and controlled devices in the AV system.
- 11.2.5.** Disconnect notification pages for all controlled devices in the system
- 11.2.6.** An "HELP" page showing a visual legend indicating function and use with a text overlay and arrows indicating the corresponding functions to each button or button section.
- 11.2.7.** A "Tech Support" page which provides a user with contact information for technical support.
- 11.2.8.** A notification page that there is not video present if a corresponding input is selected. (See Picture 10)
- 11.2.9.** A laptop page connection method page which allows to the user to select from 4 input types (VGA, HDMI, DP, MDP). This connection method is configured once and allows the user to select from "PC", "Laptop", and "DOC CAM".
- 11.2.10.** Starting Up page with level bar to indicate timer.
- 11.2.11.** Shutting Down page with level bar to indicate timer.
- 11.2.12.** Confirmation page to confirm shut down sequence.
- 11.2.13.** Example pages in Appendix document.

## **11.3. Transport Control**

- 11.3.1.** Provide standard Stop, Play, Pause, Fast Forward and Rewind for each playback device and menu control for Blu-Ray players. Buttons should be arranged in a conventional fashion that will be familiar to the normal user.
- 11.3.2.** The selected control function should be displayed by showing the appropriate button "pressed". It should remain this way until another function is selected.
- 11.3.3.** For devices that will go into a standby mode after a period of time, the control system shall sense this mode and restore normal operating mode once a transport function has been selected. This may require the use of current sensors to determine the state of the unit. No direct user action should be required at the playback device to restore the normal operating mode.

#### **11.4. Level Control**

- 11.4.1. Objects requiring level adjustment such as volume or tone controls shall use Up/Down buttons with a graphical representation of the actual level.
- 11.4.2. Increment of level change to be adjusted for reasonable range without the need to push the Up or Down buttons needlessly.
- 11.4.3. Pressing and holding the UP/Down buttons will cause the level to increment/decrement, which shall be visible in the volume indicator.
- 11.4.4. The volume indicator shall show direct feedback from the level that is being controlled.

#### **11.5. Volume Mute**

- 11.5.1. Where the ability to mute the sound is needed, the button shall use the label "MUTE" and "UNMUTE". This will be a single button set up as a toggle.
- 11.5.2. When in a "MUTE" mode, pushing the "VOL UP" button shall restore the sound and bring the system out of the muted mode.
- 11.5.3. MUTE/UNMUTE buttons shall change color to indicate the status of the button. When in "MUTE" mode, the button shall flash.

#### **11.6. Standard Colors**

- 11.6.1. Each button shall have an image that depicts its related function.
  - 11.6.1.1. For example, the "HDMI" source connector shall be linked to a button with an HDMI image, the lectern computer source shall be linked to a button with a PC or computer image, etc.
- 11.6.2. Control functions shall be color coded to add clarity and show relationships between different groups of controls.
- 11.6.3. The color Red shall be reserved to indicate a fault or abnormal condition, or a "Close"/"Back" button.
- 11.6.4. Green may be used to indicate normal operation, or an active connection status.
- 11.6.5. Similar controls should maintain the same color scheme across all control pages.
- 11.6.6. When a function is selected, the graphic depiction of that button should appear to be pressed and its color changed to yellow.
- 11.6.7. Each input button shall have a status ring showing whether a video source is connected to the corresponding input. The ring shall be red for "no source" and green for when a source is connected and synced. (See Picture 2)

- 11.6.8.** Color schemes used for background and foreground objects should be selected to be complimentary and provide a consistent theme throughout the control pages. The College shall provide logos as necessary.

#### **11.7. Minimum Button Size and Placement**

- 11.7.1.** Minimum visual size of a button is 3/8" wide by 1/4" high.
- 11.7.2.** Spacing between buttons should be no less than 1/16".
- 11.7.3.** Where buttons are immediately adjacent, the active selection area of the button should be reduced to 80% of the visual area of the button.

#### **11.8. Button Actions**

- 11.8.1.** When a function on a control page is selected, that button or visual object associated with that function should change to reflect what has been chosen.
- 11.8.2.** For functions that are momentary selections (i.e. VOL UP), the change of state is visible for as long as the button is being pressed.
- 11.8.3.** When feedback is available, for function that are maintained selections (i.e. PLAY), the change of state remains visible until another function is selected and resets the previous function.
- 11.8.4.** The state change of a button or visible object should depict real-world objects as much as possible. This includes the appearance of the button be pressed inward, a change in shade of the original color, but not a change in hue.
- 11.8.5.** Non-pertinent buttons shall not be visible when not in use or function is not available. Button shall become visible when function is available. For example, an end call button is only visible when a call is active.
- 11.8.6.** If an input is selected, but there is no video present, then a window will display for 5 seconds indicating "System does not recognize video, please check your device and try again." (See Picture 10)

#### **11.9. Labels**

- 11.9.1.** Use of simple words or titles is preferred to indicate functionality, navigation, and system status.
- 11.9.2.** Use of stylish symbols should be avoided unless their identity is commonly recognized by the general public or approved by the College. Standard symbols for transport functions are acceptable.
- 11.9.3.** Labels should be presented in a clear, sans serif type face that will remain legible on lower resolution touch panels.



- 11.9.4.** Where physical buttons are present along the side of a touch panel, these buttons should be engraved and filled with a contrasting color.

**11.10. Power On/Off**

- 11.10.1.** For panels requiring an ON/OFF control, these functions should be linked through current sensors or other methods of programming for the control system to detect the power on condition of the component being controlled.
- 11.10.2.** Powering off a system should not interfere with the ability of a projector to complete its cool down cycle.
- 11.10.3.** Powering off a system shall also mute the audio outputs and microphones and/or put the amplifier in "Standby" mode.
- 11.10.4.** A "Power ON" function shall automate the start-up of the system turning on all associated displays, lowering powered screens, sensing the state of a divisible room, recalling lighting presets, unmuting the audio system, and selecting the lectern PC input to the projector and change the associated source select button. If the PC video output is not present, then the default main page will show with no sources selected with a text line "Please select source to begin."
- 11.10.5.** If there are possible scenarios for parts of the system to start up, it is the Contractor's responsibility to submit concepts of the start-up sequence to be approved by the College prior to uploading the programming.

**11.11. Look & Feel**

- 11.11.1.** Control pages should utilize a clean, elegant but stylish appearance.
- 11.11.2.** Use a common graphical template across all control pages for a consistent look.
- 11.11.3.** The touch screen layout should utilize graphical elements such as drop shadows, gradient fills and transparency to provide a pleasing overall appearance.
- 11.11.4.** Utilize graphical representations of floor plans to convey location information.
- 11.11.5.** Include College logos, icons or watermarks to portray the College identity.
- 11.11.6.** Provide clear navigation tools for moving between control pages.
- 11.11.7.** Each sub-page should have a "BACK" button to return to the previous page. This button should appear in the same location on each page.

**11.11.8.** Provide an "INFO" button or icon on each user page to provide clear, non-technical instructions on how to use the functions available to regular users.

**11.11.8.1.** A second button with show for tech support with this page.

**11.12. Security**

**11.12.1.** Where requested, provide password access to control pages not intended to be accessed by the general public.

**11.12.2.** Unless otherwise noted, provide a minimum of two levels of access.

**11.12.2.1.** General User

**11.12.2.2.** AV Technician

**11.12.3.** Segregate the control functions to only allow authorized individuals access to more sophisticated control pages.

**11.12.4.** Provide a timeout feature to automatically return the control panel back to the default opening screen after 30 seconds of inactivity. After this reset, passwords must be reentered to return to a previous control page.

**11.13. Presets**

**11.13.1.** For systems that have different operating modes or configurations, provide the ability to store and recall preset combinations of system settings.

**11.13.2.** Provide a "Preset" page that permits a minimum of five presets to be recalled. Each button to include a label describing the function or configuration associated with that button.

**11.13.3.** Provide the ability for new presets to be stored over previous settings. New preset to be able to change the label to reflect the new or revised configuration.

**11.13.4.** When a preset has been recalled, the control page should indicate the active configuration.

**12. Monitors**

**12.1.** The Campus shall provide the contractor the contact information for email notifications from the control processors.

**12.2.** A Monitor shall be created for every error state the control processor can read.

**12.3.** A Monitor shall be created for connect and disconnect conditions within the AV system.



**12.4.** A monitor shall be created in the event that the projector is muted for longer than 30 minutes.

**12.4.1.** This will send an email notification as well as shutting down the AV system.

**12.5.** A monitor shall be created for system inactivity of 4 hours.

**12.5.1.** This will send an email notification as well as shutting down the AV system.

**12.6.** If there is a critical disconnection, disconnect pages shall disable touchpanel function until connection is restored.