**UTC Building & Industrial Systems: MobileView™**

**Mobile digital video recording system**

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# The mobile digital video capture/storage/transmission system shall be a UTC Building & Industrial Systems MobileView 3000 series.

1. **Digital Video Recorder (DVR)**
   1. The system shall be designed as an application-specific, vehicular-based digital video image capture, storage, retrieval, and transmission system.
   2. At a minimum, the DVR shall support the following characteristics:
      1. The recorder shall have a digital video imaging processor with a minimum of 1000GB (1TB) of removable mass storage.
      2. It shall have an operational voltage range from 9 to 32 VDC inclusive, with 12VDC & 24VDC nominal ranges.
      3. It shall provide model options of 4, 8 and 12 video input channels.
         1. Video channels shall be individually configurable to support
            1. Up to 30 frames per second per channel capture rate with a maximum of 240 frames per second (480 ips).
            2. Resolution settings of QCIF, CIF, 2CIF, and 4CIF
      4. It shall support simultaneous recording of dual video streams per channel.
      5. It shall support the ability to individually program frame rate on each video stream of each video input channel.
      6. It shall support the ability to individually program image resolution on each video stream of each video input channel.
      7. It shall support the ability to individually set the brightness, contrast, and color of each video input channel.
      8. It shall be support PAL or NTSC cameras via both manual configuration and automatic format detection.
      9. It shall be shock and vibration tested to SAE-J1455 standards from an accredited laboratory and shall be found to meet or exceed these specified standards.
         1. Vibration: Tested per SAE-J1455 section 4.11.3.4
         2. Shock: Tested per SAE-4.10.4.2
      10. It shall meet FCC Class A, Subpart 15 standards when operating and connected to cameras.
      11. It shall employ a removable mass storage device that does not require system shutdown prior to removal.
      12. It shall be fully programmable via laptop using a web browser without a proprietary software client.
      13. It shall provide (2) two separately addressable Ethernet ports.
      14. It shall provide peripheral connectivity via three (3) USB ports and four (4) RS-232 serial ports and one (1) RS-485 port.
      15. It shall provide twelve (12) user-configurable digital inputs which shall themselves support user configuration of normally open circuit and normally closed circuit as alarm.
      16. It shall provide two (2) special purpose digital outputs which indicate operational status of recording and fault.
      17. It shall provide two (2) user-configurable, SPDT relay outputs.
      18. It shall provide a user-programmable, video output capable of showing between one (1) and twelve (12) video inputs channels simultaneously in a multiplexed display or sequentially in a switched display.
      19. It shall provide device connection via wiring harnesses having a positive lock with quick disconnect function.
   3. The DVR shall operate from a proprietary, embedded system platform with the following features:
      1. It shall implement the embedded operating system on non-volatile but updatable memory which shall contain no moving parts.
      2. It shall have an on-board, real-time clock.
      3. It shall support the user-configurable clock synchronization via manual update, automatic NTP server update, and automatic GPS update.
      4. The DVR shall store implement storage of system configuration and programming functions on non-volatile but updatable memory which shall contain no moving parts.
      5. It shall prevent unauthorized program tampering through the use of a logon account and pass code.
   4. The DVR shall include integrated (internal to the device) wireless transmission technology.
      1. At minimum it shall support 802.11 b/g Wi-Fi with options for 802.11 a/b/g/n Wi-Fi
      2. It shall support wireless client mode
      3. It shall support WEP, WPA, WPA2, TKIP, & AES security protocols
      4. It shall be support transmission of video data
   5. The DVR shall weigh not more than 13 lbs.
   6. The DVR manufacturer shall provide cameras with the following specification(s) designed for the system, with the following features as a minimum:
      1. Cameras housings and screws shall be tamper-resistant and of the following types:
         1. Surface or flush mounted
         2. Forward facing that allows mounting or hanging from the ceiling. It shall include a rubber lens shield to prevent glare from interior lighting and contact with vehicle windshield.
      2. Interior cameras shall be available in color with an option for wide dynamic range.
         1. The wide dynamic range camera shall supply:
            1. 520 HTVL
            2. Dynamic range equal to (102dB typical, 120dB max)
            3. Various lens configurations
      3. Externally mounted cameras and cameras with views external to the vehicle shall meet the following requirements:
         1. Camera shall be a color day/night camera (automatically switching from color to black/white via a mechanical cut filter in low-light conditions) with operation down to at least 0.3 Lux.
         2. Externally mounted cameras shall have a water-proof, sturdy design able to stand up against the normal external wear and tear of a vehicle due to tree branches, vehicle washes, etc.
         3. Externally mounted cameras shall be impact and tamper-resistant and have at least IP 66 rating.
         4. Externally mounted cameras shall have a built-in Infrared Illuminator to enhance low-light response.
         5. Forward viewing camera shall have a varifocal lens with a range of at least 4– 8 mm.
         6. Forward viewing camera shall have wide dynamic range to reduce the effects of oncoming headlights or other lights experienced when operating during night time.
      4. The recorder shall accept standard NTSC or PAL video signals with 1-volt peak-to-peak signal at the recorder.
   7. The DVR manufacturer shall make available an optional accelerometer sensor, specifically designed for the system, with the following features as a minimum:
      1. The accelerometer sensor shall respond to changes in acceleration on the X-axis, Y-axis, and Z-axis.
      2. The accelerometer sensor shall utilize a serial data interface (relays and digital or analog voltage level sensors shall not be considered equivalent) specifically designed to provide the recorder acceleration response in all three axis.
      3. The accelerometer sensor shall require no separate power connection, and support operation at distances up to 25’ from the recorder.
      4. The accelerometer sensor shall be adaptable to flat-surface mounting (typically, the frame of the vehicle), in order to minimize vibration.
      5. The recorder shall provide built-in diagnostic and configuration software for the accelerometer sensor.
      6. The recorder shall permit event activation if acceleration alarm is detected.
   8. The DVR manufacturer shall make available an optional remote video transmission system which shall support the following:
      1. Transmission of images from the DVR to a central monitoring station
      2. Bi-directional transmission shall be supported, meaning:
         1. The recorder may automatically send event video to the central station.
         2. The central station may request video information stored locally on the recorder or live video as determined by the system operator.
      3. The DVR shall specifically support data and video transmission utilizing wireless technologies.
2. **Operational Features:**
   1. The DVR shall support the following recording characteristics:
      1. The DVR shall continue to function for up to 99 minutes after the ignition has been turned off. Exact duration shall be user-configurable.
      2. The DVR shall record surveillance and event video on a removable, mass storage device. No videotape or videotape recorders shall be used. The DVR shall support at minimum a storage size of 1000GB with an option for 2000GB.
      3. The DVR shall digitally capture and store images into a proprietary format which embeds tamper detection technology.
         1. Video transferred from the DVR by any means shall include tamper detection technology.
         2. Qualified software shall be capable of reliably detecting when captured video data has been altered (tampered) from the original state.
      4. Information related to the DVR shall be stored and embedded into the video stream as it occurs and shall include:
         1. Recorder specific information
            1. DVR identification
            2. Time and date
            3. Camera identification
         2. GPS data
            1. Geo-location (latitude & longitude)
            2. Speed
         3. Recorder status
            1. Input and output state
            2. Fault status
            3. Recording state
      5. The DVR shall provide for several record settings:
         1. Capture rate shall be user-configurable ranging between 1 & 30 fps NTSC (1 & 25 fps PAL).
         2. Image resolution shall be user selectable from these settings:
            1. CIF
            2. 2CIF
            3. 4CIF
         3. Setting changes shall be viewable within an image preview window.
      6. The DVR shall support tagging video over a time range as protected when a defined input activation occurs.
         1. Input activations which support video protection shall include:
            1. Digital input state change
            2. Speed above a set value
            3. Impact at or above 4G as detected by optional external equipment
            4. Acceleration characteristics as detected by optional external equipment
         2. Upon activation, inputs shall be masked (ignored) for a user configurable duration up to 255 seconds.
         3. It shall be possible to mask (ignore) inputs are in an active state upon DVR startup so as to prevent unintentional video protection.
         4. Protected video shall be secure from overwrite for a user configurable number of days up to 90.
      7. The DVR shall support time stamped activity logging of routine and critical system events.
         1. The activity log shall be stored on dedicated non-volatile memory device with size sufficient to store a minimum of 90 days of log entries.
         2. The activity log shall be written sequentially in a circular First-In-First-Out (FIFO) manner. Thus entries are written at the start of the memory space through to its end whereupon the process restarts at the beginning.
         3. The log shall at minimum include the following routine and critical activity:
            1. DVR and media identification parameter
            2. Startup & shutdown sequences
            3. System faults and errors
            4. System recording status
            5. Video protection actions
            6. Input and Output state changes
            7. Storage media health
      8. The DVR shall record all surveillance data to compatible storage media.
         1. Storage media shall be housed within a removable and lockable caddy.
         2. System shutdown prior to removal or insertion of the media caddy shall not be required.
         3. Surveillance data shall be written to storage media sequentially in a circular First-In-First-Out (FIFO) manner.
   2. The DVR shall have optional transmission capabilities.
      1. The DVR shall support transmission of vehicle specific data upon request by the central station or other authorized remote user. Such data shall include but not be limited to
         1. Live video images
         2. Previously recorded images
         3. Data marked as protected
         4. System configuration
         5. System health parameter
         6. DVR log
   3. The DVR shall support the following alarm event functions:
      1. The DVR shall support user-programmable events consisting of activation triggers and reaction responses.
      2. Event triggers shall at minimum include
         1. Digital input state (On/Off)
         2. Speed above a set value
         3. Impact at or above 4G
         4. Acceleration alarm
      3. Event reaction responses shall at minimum include:
         1. Tag (mark) section of video as protected
         2. Change state of digital output
         3. Display video input(s) on the multiplexed video output
         4. Temporarily enable audio recording during user defined post-event time
         5. Temporarily enable video recording during user defined post-event time
         6. Change video channel frame rate
         7. Shutdown the recorder
      4. The video protection function shall support a user-programmable pre-event and post-event setting between 0 and 10 minutes.
   4. The DVR shall support the following central station capabilities:
      1. The system shall support network connection to a central station.
      2. The system shall support the following functions at the central station:
         1. View current log file
         2. View images
         3. Store images
         4. Video playback, forward, and reverse
         5. Increase or decrease playback speed
         6. Pause video
         7. Search for a playback location by time & date
      3. The system shall support data download to the central station running compatible software, as follows:
         1. The system shall connect to the central station through a wireless network link.
            1. The system shall announce its presence to the central station upon connection to the wireless network.
            2. The system shall service central station requests to access and review stored data.
         2. The removable media caddy may be inserted into a docking station which is direct connected to central station via a standard USB link.
            1. At minimum, the docking station shall support the USB 2.0 standard.
            2. Via that link and with compatible software, the central station may directly access data stored on the media caddy.
         3. Data transferred to the central station from the system or media caddy may be transferred to long-term storage, including but not limited to the following:
            1. Network storage locations
            2. Portable mass memory devices (thumb drives)
            3. Recordable optical media (CD/DVD)
      4. The systems shall support the following video playback capabilities at a minimum:
         1. Playback at positive or negative integer multipliers of normal speeds, in either forward or reverse modes, without distortion.
         2. Media search capabilities including but not limited to:
            1. DVR identification filter
            2. Date and time filter
            3. Protected data type filter
            4. Camera alarm filter
   5. The DVR shall support the following programming capabilities:
      1. Display options
         1. Vehicle identification
         2. Camera identification
         3. Time and date
         4. GPS data
         5. Speed
         6. Video status per channel
   6. The DVR shall support the following alarm capabilities:
      1. The DVR shall support twelve optically isolated digital inputs which may be associated with events to perform actions such as
         1. Protect a section of video
         2. Increase capture rate of selected video channels
         3. Display video inputs on the multiplex video output
         4. Turn on a disabled video channel
         5. Turn on disabled audio
         6. Activate an output relay
         7. Shutdown the system
   7. The DVR shall support Ethernet communications:
      1. The system shall not stop recording during Ethernet access.
      2. The system shall support programming of the following parameters for each general purpose Ethernet port:
         1. Static and DHCP IP address modes
         2. IP address assignment for static mode
         3. IP address display for DHCP mode
         4. Default gateway
         5. Sub-net mask
         6. DNS
   8. The DVR shall support the following time synchronization capabilities:
      1. Synchronization via GPS (if so equipped)
      2. Synchronization to a NTP server
   9. The DVR shall support networking standards including but not limited to:
      1. DHCP
         1. The system shall provide its machine name when obtaining an IP address from the DNS server.
      2. DNS
         1. The system shall support registration of its machine name to a network DNS server.
3. **Additional specifications:**
   1. Video inputs
      1. There shall be four (4), eight (8), or twelve (12) video inputs, as designated by model, equipped with an equivalent quantity of BNC connectors on a supplied harness.
      2. Inputs shall support NTSC or PAL signal standards but not both simultaneously.
      3. Inputs shall accept video levels from 0.7 to 1.0 volts peak-to-peak.
   2. The DVR shall support audio recording with the following capabilities:
      1. Up to twelve (12) line level audio input channels
         1. Number of available audio channels shall meet or exceed the number of video channels
         2. Individually configurable.
            1. Enabled or disabled
            2. User definable channel label
            3. Selectable gain or attenuation adjustment
      2. Audio shall be synchronized with the video.
      3. DVR shall support one (1) audio output
         1. Audio output shall be duplicated from any one configured audio input channel
   3. The DVR shall incorporate the following electrical specifications:
      1. Input voltages to be supported: 9 to 32 VDC inclusive, with 12VDC and 24VDC nominal.
      2. It shall be protected against power surges and spikes.
      3. Operating power: 45 W nominal, excluding externally-connected devices
   4. The DVR shall incorporate the following mechanical specifications:
      1. Size: 14.5” x 11.0” x 3.75" (W x D x H)
   5. The DVR shall incorporate the following environmental specifications:
      1. Operating temperature 0 to 55 °C (external ambient)
      2. Relative humidity: 90% non-condensing
      3. Ingress Rating of IP43
4. **CCTV Video Review Application:**
   1. The software shall be backward compatible with previously released hardware versions of the MobileView III which are running the most recent compatible firmware.
   2. The software shall provide basic functionality including but not limited to play forward, pause & play backwards, play with synchronized audio, move forward frame by frame, move backward frame, fast forward and reverse
   3. The software shall enable the user to save a series of individual images to a sub-directory.
   4. The software shall support digitally scaling recorded video aspect ratio to fill the video display area or locking content to its original aspect ratio by user configuration.
   5. The software shall allow time and date searches of recorded information
   6. The software shall permit incident location via time search by direct entry into a time/date field or via drag/drop of a time line bar.
   7. The software shall support the following image save methods:
      1. Single image frame to file
      2. Multiple frames between times to directory
      3. Video file to directory
   8. The software shall support writing saved video files to removable, writable media.
      1. CDR/CDRW
      2. DVDR/DVDRW
      3. USB Flash Drive
5. **GPS**
   1. GPS function shall support minimum of 16 tracking channels
   2. GPS velocity accuracy shall be 0.1m/sec
   3. GPS polling and update shall occur at 1pps, minimum
   4. GPS frequency shall be L1, 1575.42Mhz
   5. GPS information recorded will be latitude, longitude and speed
   6. GPS information display shall be overlaid upon a map window
      1. GPS coordinate data shall be synchronized to recorded video
      2. Map overlay shall support raster image formats

## General Conditions

* 1. Company References
     1. Vendor shall have at a minimum ten years of experience installing, servicing and selling a transit version recorder in the public transit market.
     2. Vendor shall have (and submit a list) in excess of 50 transit customers in North America.
     3. Vendor shall be able to service or upgrade all existing versions of recorders currently employed in the field.
     4. Vendor shall have at least 20,000 working (in good order) units installed and in service in North America.

1. **Wireless in Wireless Applications**
   1. Vendor shall have at least (3) Wireless projects operational in North America. (Project defined as at least 50 vehicles (minimum) in a fleet sending and receiving commands and/or video information).
   2. Vendor shall have experience to lead the design and deployment of advanced integrated networks supporting high-capacity data downloads and low-latency data streams across a mix of Cellular, Wi-Fi, WiMAX and similar mesh technologies.
   3. Vendor shall be able to design and implement Wired and Wireless networks to support Mobile CCTV uploads. These designs should be able to integrate into the following:
      1. Existing customer Domain Networks
      2. Standalone Extension
      3. Virtual and physical server environments
      4. Integrating management system into corporate Wi-Fi networks and group policies
   4. Vendor shall have experience accommodating different physical deployment options including but not limited to:
      1. Fuel Lanes
      2. Indoor Vehicle Locations
      3. Outdoor Vehicle Locations
      4. Rail Yards (Heavy/Light Rail)
      5. Bus Yards
   5. Vendor shall have experience installing, integrating and troubleshooting simple and complex corporate network infrastructures.
   6. Vendor shall have experience transmitting live video over cellular and vehicle Wi-Fi hotspots.