

NSTX-U Test Cell Camera Surveillance System Requirements

Rev. 0

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0: Revisions

[03/17/2017] First draft defined.

1: Goals:

The goals of the NSTX-U Test Cell Surveillance System (TCSS) are four-fold:

- Provide monitoring of NSTX-U buswork, moorings and equipment for damage by unintended movement from each location cited in section 5.
- Provide means to review video acquired during pulses of NSTX-U from each location cited in section 5.
- Provide appropriate display equipment to view recorded and streaming data.

See the NSTX-U Instrumentation and Benchmarking Test Plan (NSTX-Plan-12-207, Rev. 1) for additional motivation, including references to required documentation.

2: References

NSTX-Plan-12-207, Rev. 1: NSTX-U Instrumentation and Benchmarking Test Plan

3: Camera Requirements

- Cameras and any related structures shall not impede or modify the underlying mechanical, electrical, or thermal design features of the component to which they are mounted.
- Cameras and their related equipment shall be potentially protected from physical damage resulting from normal movements of personnel and equipment in the area in which they are located. Protection includes appropriate physical placement as well as additional installation material to reduce the risk of damaging cameras and related equipment. Commercial Off The Shelf (COTS) solutions are preferred.
- The cameras and related system shall function reliably and accurately with confidence in the magnetic environment of NSTX-U. Performance issues like minor image distortion during pulses are acceptable but not ideal.
- Additional cameras of each type should be purchased as spares. A reasonable number of each as determined by the RLM.

- Control of moveable cameras should be limited to a subset of approved NSTX-U personnel to prevent conflict or loss of intended use.
- Camera units utilizing Ethernet connectivity should use domain names that describe their intended use and optionally their location.

4: Acquisition and Archiving Requirements

The data acquisition for this system shall satisfy the following high-level requirements:

- The system shall record video, and optionally audio, from an adjustable, pre-selected time and cease recording at a preselected time.
- The recorded content shall be archived in a format that can be viewed by common media playback software.
- The archived data shall be retained until deemed unnecessary or obsolete.
- The data shall be archived in such a way that the source camera unit and location “metadata” is included in the unit network name or recorded file naming convention(s).
- The system shall NOT record or archive during non-operational periods of NSTX-U.

Post-processing, machine vision or other advanced features of this system shall be specified in a future revision to this document or follow-on requirement document.

5: Camera Location Specification

The following notes apply:

- A clear camera naming convention shall be established. This convention shall unambiguously identify the camera location and type. This same convention shall be used in any reference to this system or its components in official documents or saved files.
- All cameras shall be installed at the location specified in Final Design Review.

Elevation	Location	Already Implemented	Camera Type	Items Viewed
Top Views	119' Cat Three Racks	No	WV-SC588	Top of machine from SW, PF-1a Leads, Top of Bus Tower
	119' Pole South Side	Yes	WV-SC588	Top of machine from SE side
	North side of RF transmission lines, potentially on elevated pole	No	WV-SC588	very top from NE side
	NB #1 Railing at Front of NB Line	No	WV-SC588	top and midplane at NE side
Midplane Views	Bay H Midplane	Yes	WV-SC385	All flexible cables in the bus tower as they run to the coils
	Above Rack 448 or nearby	No	WV-SC385	NW View of midplane, LGI
	Near T837, near 495	No	WV-SC385	Midplane SW view of machine, many racks on 109' level, LLNL Spectrometers, RF piping
Lower Views	Directly Under OH Lead	Yes	WV-SC385	TF Straps, OH Leads
	Pillar under machine at Bay H	Yes	WV-SC385	PF-1aU Flex Leads
	Under cable tray N433 on SW side of machine	No	WV-SC385	Bottom of machine from SW, Water systems
	Under cable tray L433 on NE side of machine	No	WV-SC385	Bottom of machine from NW, some water system
	Horizontal platform at chest level near conduit 62205C, above MAPP chiller	No	WV-SC385	Bottom of machine from NW, MAPP Probe, Some CAT 4 Racks, lower bus tower.

6. Display Requirements

In this section, the primary display refers to the display used by the Chief Operations Engineer. Secondary displays refer to displays used by other individuals to monitor spelect views

- Display and view manipulation equipment should meet Ergonomic and Human Machine Interface (HMI) standards for mounting, placement and design.
- The primary display and HMI equipment shall be placed in the NSTX-U Control room near Chief Operating Engineer (COE) station.
- Primary display equipment should support viewing all relevant cameras simultaneously with at least 16:9 aspect ratio per camera view.
- Secondary displays should be available for viewing remotely, separately from Primary display. Manipulation of camera viewpoint and zoom functionality should be prioritized or restricted to the COE station during NSTX-U operations.

7. System Monitoring Requirements

All components of this system are not deemed required for NSTX-U operations and as such no automated shot cycle suppression will occur if a component of the system fails or become unavailable. Suppressing NSTX-U operational activity will be left to the discretion of the Chief Operating Engineer in the event of partial or total failure.

- The configuration required to initiate and control DVR recording will be integrated into CODAC archiving systems such as EPICS archiver or MDSplus.