DESIGN REVIEW DOCUMENTATION – RESULTS – No: NSTXU_1-8-1-4-3_FDRS_100__#

Title: NTC Network Expansion (CWDM)

CAT: ☐A1 ☐A2 ☒A3

Type of Review: ☐ **Peer** ☐ **CDR** ☐ **PDR** ☒ **FDR**

Cognizant Individual: John Dong **Date of Review:** June 24, 2019

Review Board Members:	**Invited Attendees:**	**Other Attendees:**
Chairperson J. Dellas	P. Sichta	T. Stevenson
RE G. Tchilinguirian	S. Kampel	R. Ellis
TA (*Control & Data)*	F. Hoffman	P. Dugan
G.Tchilinguirian	M. Cropper	S. Horst
TA (____)	A. Borker	
TA (____)	D. Battaglia	
	N. Rahman	
QA A. Castaneda		
ESH		
Regulatory Compliance		

Items Reviewed:	**Sat.**	**Unsat.**	**Comments or n/a if not applicable**
Appropriate requirements identified	☒	☐	
Development plans and schedules	☒	☐	Phased implementation plan
Reg. compliance incl. USI/USID and NEPA	☐	☐	N/A
Disposition of CHITS from previous reviews	☒	☐	
Cost objectives	☒	☐	
Other review objectives addressed	☒	☐	Calculation on attenuation

SUMMARY OF RESULTS:

This review presented the implementation of CWDM (Coarse Wave Division Multiplexing) as a means to increase the fiber optic data capacity of the NTC network. CWDM is an established network technology widely implemented for increasing data capacity through multiplexing and demultiplexing data through fiber optic wavelength channels. To verify suitability for use at PPPL, a bench test was initially conducted where output power and spectrum was evaluated. This was followed up with a pilot project where various networked devices in use at the Lab were evaluated with a pilot CWDM infrastructure. The implementation of CWDM will occur as multi-phased project. This FDR addressed the first phase, which will immediately implement 48 CWDM network circuits using six existing single mode fibers installed between the test cell (rack CTC-EE-447) and DARM and then following up with the installation of 42 additional single mode fibers between the NSTX DARM and the test cell rack CTC-EE-402, to provide 192 additional CWDM network connections (the remaining available fibers planned use will be for standard single-mode circuits). It is noted while CWDM allows for up to 18 channels per fiber only 16 channels will be implemented, as that was the number of channels which were tested and measured. It is also planned to proceed with 1GB/sec speed even though up to 10GB/sec is possible.

The test results successfully verified the suitability of the system within the PPPL network environment and the lessons learned as a result of the testing provided useful information on future implementation. Existing components used during the testing will be kept as spares for the future installation. Due to the inexpensive cost of components (mux/demux), direct replacement is an attractive method to address failures or other performance issues. There were a total of four chits generated from this review.

Disposition: [check one]
_____ **Acceptable**
__X____ **Acceptable pending resolution of concerns**- CHITS identified above must be resolved prior to installation.
_____ **Incomplete -** Additional design work is required prior to another design review.
_____ **Unsuccessful** – Corrective actions must be taken and another review process must be initiated.

Design Review Chair Person John Dellas Digitally signed by John Dellas DN: cn=John Dellas, o=Princeton Plasma Physics Laboratory, ou=NSTX-U Recovery Project - Power Systems, email=jdellas@pppl.gov, c=US Date: 2019.07.03 14:35:43 -04'00' Date: _____

Cognizant Individual Acceptance _G. Tchilinguirian for John Dong GREGORY J TCHILINGUIRIAN Digitally signed by GREGORY J TCHILINGUIRIAN Date: 2019.07.10 11:39:15 -04'00'
Date:_____

Distribution: Review Board Members, Operations Center, Responsible Engineer (RE), Cognizant Individuals, Project Manager, Project Director, relevant Technical Authorities (TAs), Chief Engineer (CE), Fire Protection Engineer, Attendees, QA, ES&H, Security, Requesting & Performing Dept. Head