

Subject: Additional information in relation to the SURFnet Request for Information Document for a SURFnet8 Industry Partner

Date: September 17, 2015

Dear Madam/Sir,

Please find herewith the answers of general interest to all questions received, so far, concerning the above-mentioned Request for Information Document. This information is given to all companies that have shown interest during the market consultation phase. Insofar this note contains modification and/or additions to the Request for Information Document and/or previous Q&A documents, the text in this note prevails.

Please take note of this document in preparing your response.

Kind regards,
Jac Kloots
SURFnet

#	Question	Answer
1.	Par. 2.2.4 Network Management: in this paragraph we identified a broken link (see Fout! Verwijzingsbron niet gevonden.) Would it be possible to provide us with source ?	This broken link is a reference to figure 2.
2.	Question 23: this question is unclear due to a broken link. Could you please provide us with the missing information ?	"Section 4.6"
3.	Question 65: could you please inform us: - how many Access ports will there be in the network ? - how many LSP Tunnels will there be ?	The number of access ports in SURFnet7 is roughly 1000. In SURFnet8 we expect that this number will have the same order of magnitude. The number of tunnels in SURFnet7 is roughly 1000 as well. In SURFnet8 we expect that this number will have the same order of magnitude. However SURFnet could imagine that a non-LSP solution can also offer the same transport function in SURFnet8. In other words SURFnet is open to any transport protocol for the transport layer.
4.	We have a question about the metro vs. core nodes in terms of DWDM features that are relevant to Surfnet for the SN8 network: There are several features like directionless, flexible grid that are mentioned in section 4.2 of the SN8_rfi_v1 1.pdf document. We would like to know if the metro nodes limited to a two degree architecture shall also be directionless as in the core nodes ?	At present this capability is not part of SURFnet's vision. However if vendor can argue that the reuse of the DWDM IFs on metro nodes in cooperation with the service layer improves reliability or improves service performance SURFnet would consider such a feature / capability. In such a case SURFnet would also like to understand the cost structure versus the benefits of such a feature.

5.	Section 2.1.7: We understand that the alien wavelengths to be carried over new DWDM network are supporting wavelength grid as per ITU-T G.694.1. Kindly confirm the same.	The current alien waves are fixed on a 50GHz ITU grid. In the future newly transported alien waves could be super channels that are mapped to G.694.1 flex grid, in order to occupy as little spectrum as possible.
6.	Section 2.1.8: We understand that the White rabbit network is already in place and what is expected from the RFI/RFP for new network is: 1) Proposed DWDM equipment should have capability to support Bi-directional Transmission over a single fiber. 2) DWDM network to support at least 40 Channels of DWDM over a single strand of fiber for both Tx and Rx. Please confirm if our understanding is correct.	The interpretation of the vendor appears to be a possible solution. SURFnet does not exclude other possible solutions to exist that are compatible with WR concept, such as a bidirectional signal outside the C-band using e.g. a filter that is placed directly after the line interface module. Vendors are encouraged to provide a novel or creative solution.
7.	Section 2.2.1: It's mentioned that all core nodes are equipped with 1:5 WSS based ROADM. As per Figure 10 in Annexure A, location UT001A is shown to be having 6 directions. We understand that at this location a single node is having a 6 Direction ROADM, and it is not a combination of two 5 degree ROADM. Please confirm if our understanding is correct.	At present the WSS elements of the ROADM node of UTRECHT are not fully interconnected (express ports). There are two links going to Amsterdam 2, hence a fully interconnected ROADM node has not been implemented. The node is not a combination of two ROADM nodes. The link Utrecht-Breda is a planned link for SURFnet8 and is currently not implemented.

8.	Section 2.2.1: "All core nodes are equipped with 1:5 WSS based ROADMs (broadcast and select) and can route incoming waves to arbitrary output fibers, effectively creating a meshed network." "Core nodes implement direction-dependent fixed-optical add and drop functionality for all 88 waves." Both the statements are in contradiction to each other. Surfnet is requested to clarify that the Core nodes are ROADM or FOADM type.	Statements are not in contradiction. For each degree 88 ch. add/drop filters are implemented, hence there is direction and wavelength fixed add and drop. Incoming waves on a line interface can be routed to a different line interface, subject to wavelength availability on that line interface.
9.	Section 2.2.1: "The modules are placed into the Next-Generation Ethernet (NGE) equipment to interface with the optical core network." We understand that since the 10G DWDM interfaces all these wavelengths of 10G are carried over as Alien wavelength over the existing DWDM equipment's.	Yes, these waves can be considered "alien". They are not part of a transponder or OTN-switch system and it's DWDM light system.
10.	Section 2.2.1: "Metro nodes implement direction-dependent fixed-optical add and drop functionality per 8-channel group." We understand that all Metro locations have Fixed type OADM filters with maximum add drop of 8 Channels in each direction. Please confirm if our understanding is correct.	A metro node may contain multiple (up to three) 8-channel OADM filters per direction (i.e. up to a total of 24 channels).

11.	Section 2.2.1: "The CWDM transceivers placed in the Ethernet switches to interface with the Regional and City rings are also pluggable modules, and can support speeds of 1Gbps and 10Gbps and are limited to 80km." We understand only passive filters are deployed w.r.t. CWDM nodes, and all the Transponders/Muxponders functionality is provided through the coloured interfaces over the Ethernet Switches.	Correct. This is currently the case.
12.	Section 4.1: "Decoupling the photonic layer, including transport DWDM interfaces, from the higher layers where service related functionality is implemented, will allow SURFnet to innovate each of these layers independently." We understand that although currently the coloured interfaces are populated in the Ethernet switches itself today, however for this RFI Surfnet envisages to have coloured interfaces in the Optical layer itself (DWDM/CWDM). Please confirm if our understanding is correct.	Yes, your understanding is correct. Have as little as possible dependencies between the photonic layer and the service layer has a preference. If a solution can only be realized with coloured IFs in the service layer equipment, then this is possible, given the DWDM IFs can also be operated as transponders. Rationale: SURFnet wants to reuse DWDM interfaces and replace only the service layer functionality in case service layer functionality does not evolve.

13.	Section 4.1: "A solution might have WDM interfaces that are deployed in the Switching and Router layer (in chassis that also implement the service fabric)." We understand this can be an alternate solution where existing higher layers are used as it is using there coloured interfaces in the new DWDM/CWDM Equipment as a alien wavelength. We understand this is alternate to the main solution where all coloured interfaces are envisaged in Optical layer itself (DWDM/CWDM). Please confirm if our understanding is correct.	Yes, your understanding is correct. Have as little as possible dependencies between the photonic layer and the service layer has a preference. Vendor is allowed to place coloured IFs in service layer equipment, only when it is possible to configure the service layer equipment in a transponder mode because when features on the service layer equipment do not evolve or do no longer meet SURFnet requirements. Rationale: SURFnet wants to reuse DWDM interfaces and replace only the service layer functionality in such a case.
14.	Section 4.2a: Please confirm if a mixed network of 10+100G is envisaged for Core layer, or Surfnet intends to limit the 10G channel layers till Metro and Regional layers only, and Core network has to be totally 100G coherent system.	100Gbps between core and metro nodes. (SURFnet envisages a DCF free core network). Regional rings and city rings are to carry 10G and in the future 100G starting with selected customers.
15.	Section 4.2e: "CWDM add/drop multiplexers which are currently deployed the City and Regional rings should be reused if possible." We understand that the existing CWDM filters/multiplexers are as per the wavelength grid of CWDM according to ITU-T G.694.2 Please confirm the same as it is vital for using existing CWDM multiplexers.	Correct, use 1471nm to 1611nm (8 channels)

16.	Section 4.2.1: "The length of Regional rings range from 30km to 200km, where the maximum distance between two customer sites is 100km." We understand the existing CWDM interfaces are able to support 80 Kms and the Fiber infrastructure and node locations are going to remain same. Since the typical distance supported by CWDM is of 80Km, we request to limit the maximum distance for CWDM to 80 Km.	Granted, but please indicate where you do not meet the 100km requirement.
17.	Section 5.1, Question 51: We understand that vendors need to propose only the basic hardware/software for a node to meet the mentioned Node type (ROADM/FOADM/Amplifier) and in required directions and degree. All the Service interface cards or Transponders/Muxponders need to be provided against the Question 52 of Section 5.1. In case the Transponder/Muxponder need to be included within node type of Question 51, we understand it need to be populated for a single channel only to have the pricing indications. Please confirm if our understanding is correct.	Correct.