

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

Date: September 2, 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| 1. | Do the alien wavelengths only occur in cross border fibers? Will the other links have alien wavelengths? What is the significance of alien wavelengths?                                                  | No. The alien waves can occur in the core network as well. They are injected at core and metro nodes. Alien waves effectively save on the number of transponders and empower SURFnet's customers to run photonic services.                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2. | Which wavelengths of 10G CWDM in City and Regional rings in Question 14 are used? Is it 1531nm & 1551nm? For this question, is the fiber only re-used? Or is the optical layer of 10G CWDM also re-used? | SURFnet uses 8 CWDM wavelengths in its city and regional rings: 1471nm, 1491nm, 1511nm, 1531nm, 1551nm, 1571nm, 1591nm, and 1611nm. Potentially 1531nm, 1551nm, and 1571nm may show overlap with the ITU DWDM grid and allow for add/drop of coherent 100G C-band waves. On the city and regional CWDM links SURFnet prefers (if no better solution is provided by vendor) to re-use existing 10G CWDM connectivity.                                                                                                                                                                                                       |
| 3. | Could the customer provide the service matrix in the photonic transport layer, in order to provide the budgetary cost more accurately.                                                                   | <p>At this stage we do not provide a service matrix. In SN8 service platforms can rely on a supporting bandwidth fabric composed of three types of bandwidth pipes (core network):</p> <ul style="list-style-type: none"> <li>a. 100G between each metro site connecting to its adjacent metro site or adjacent core site (daisy chained).</li> <li>b. 100G between a core and its adjacent core sites.</li> <li>c. 100G between any core site and ASD_1 and 100G between any core site and ASD_2.</li> </ul> <p>Initially SURFnet will start with 100G but at a later stage capacity is likely to increase to Nx100G.</p> |

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| 4. | How is the scope of surfnet8? There are 9 core sites, 30 metro sites and 14 EDFA sites in Surfnet 7. Is the topology and the number of sites of surfnet 8 the same as surfnet 7? If not, is surfnet8 a new network or does it partly overlap with surfnet 7? | The topology (i.e. fiber infrastructure) of SN8 is almost equal to SN7. No major changes are foreseen except for the addition of a link between BD and UT (requires one amplifier site in the middle) and a link between GN and ASD_1 (requires to additional amplifier sites). These two links do not exist today, but are part of SN8 as they make BD and GN a full core node (Nodal degree of 3) instead of a metro node (nodal degree of 2). It may be assumed that all sites in SN8 are equal to the sites in SN7.                                                                                                                                                                                                                                                                                                                  |
| 5. | What are the rate requirements of Core-Core, Metro-Core, Metro-Metro, and Customer site (City and Regional ring)?                                                                                                                                            | We aim at a solution that allows us to start with 100G connectivity between Core-Core, Metro-Core, and Metro-Metro locations. SURFnet also seeks a solution to connect Customer sites to 10G and to 100G because SURFnet expects that first the customer sites that coincide with core and metro locations are migrated from 10G to 100G (short distances), but at some point also customer sites on City rings and Regional rings (large distances) will require 100G. SURFnet leaves it up to the vendor to offer solutions that can deliver this bandwidth. Solutions with high spectral efficiency are considered more interesting from a technology point of view.                                                                                                                                                                  |
| 6. | Does Surfnet prefers to re-use the existing CWDM multiplexers in City and Regional rings? Could Surfnet provide the service and interface in surfnet7?                                                                                                       | The re-use of existing CWDM multiplexers allows SURFnet to re-use the existing optical infrastructure in its City and Regional rings when customers migrate from 10GE to 100GE. (See question above). In SURFnet 7 customers connect to SURFnet's demarcation switch by means of a 1GE or 10GE SFP pluggable. This port is referred to as the Multi-Service port. The Lightpath service consists of multiple L2 transparent connections (VLAN isolated) to other locations (same demarcation box and pluggables). The IP service consists of transporting and end-to-end delivery of Internet Protocol packets to and from this customer interface. The network side of the demarcation switch connects to the CWDM platform using either a 1GE or 10GE CWDM SFP or XFP pluggable. The CWDM (de)multiplexers have a SC/PC SMF interface. |

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| 7. | <p>For Question 17, the description "/a 2000km CBF with spans of 80km G.655 or G.652 fiber and five sites (including the end points) for active equipment such as ROADMs for accessing service platforms/" is not clear. Are the 25spans*80km in total or only 4spans? How are the five sites distributed? What is the distance between these five sites?</p> | <p>The spans can be assumed 80km (for reasons of simplicity and comparison, in reality there is some variation). The CBF has a total distance of 2000km and consists of 25 fiber spans, each span is 80km in length. From the five sites two sites are the end-points (i.e. 2000km apart) and the other three sites are to be placed at arbitrary positions along the 2000km (not being the end sites).</p> |
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