

**Aanbesteding** SURFnet8 Photonic Layer  
**Aanbestedende Dienst:** SURFnet B.V.  
**Referentie:**

**Omschrijving:**

SURFnet is searching for a Partner that can provide a solution for the SURFnet8 photonic layer. The aim of the Tender Procedure is to award a Contract to a Partner that can provide the requested hardware, software and support.

For the next generations of the SURFnet network, SURFnet requires a new photonic layer. This Tender aims to renew the bandwidth providing photonic layer, which is used for SURFnet's domestic services and potentially the Cross Border Fiber (CBF) systems.

The scope of the Contract for delivering the SURFnet8 photonic layer consists of;

1. Hardware, i.e. the physical equipment including installation related materials;
2. Software and licenses (including software interfaces (APIs)) for planning, performance monitoring, troubleshooting, fault detection, provisioning, security and accounting, automation, and programmability;
3. Layer 0 and layer 1 control plane functionality;
4. Training and periodic training sessions for current staff and staff to be hired in the future, and external personnel;
5. A migration scenario from our existing Ciena CPL and DWDM layer to a new solution. This may include field service support and the provision of temporary hardware;
6. High level design activities for migration, introduction of new features or equipment, and complex changes;
7. M&S (Maintenance and Support). SURFnet will stock its own spares;
8. Installation and de-installation procedures for equipment and software;
9. Delivery and setup of a test bed.

**Toelichting:**

Dear Madam/Sir,

Please find herewith the answers to the additional questions received so far, concerning the SURFnet8 Photonic Layer tender. Insofar this information notice contains modification and/or additions to the Request for Proposals Document and/or previous information notices (Nota van Inlichtingen), the text in this notice prevails. Please take note of this document in preparing your response.

Kind regards,

Jac Kloots  
SURFnet

**Nr:**

**Categorie** Annex\_D\_TCO\_core\_model.xlsx

**Betreft** Core network capacity matrix

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**Vraag**

We noticed a mistake in the traffic matrix in-between 100G routed and totals. It relates to the core model excel file named "Annex\_D\_TCO\_core\_model.xlsx".

**Antwoord****Vrijgegeven:** 13-07-2016

A corrected worksheet is published together with this information notice (Nota van Inlichtingen).

**Nr:****Categorie** Annex\_D\_TCO\_core\_model.xlsx**Betreft** Core network distances worksheet

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**Vraag**

We think there is a mistake as the table reports node ASD001A connected to node TBD003A (Cell AT9 - 85 km).

Looking at the diagram presented in ""Core network topology"" worksheet we assume that value (85 km) should be moved to cell AT10 so to map the connection of node ASD002A to node TBD003A.

**Antwoord****Vrijgegeven:** 13-07-2016

Yes, this was a mistake. A corrected worksheet is published together with this information notice (Nota van Inlichtingen).

**Nr:****Categorie** Eisen en criteria**Betreft** MR26 (page 38, RfP) and AR9 (page 38, RfP)

6

**Vraag**

We would like to have a better understanding of this application. In particular we would like to understand how these services are expected to be inserted into the system with the other traffic. A diagram/schematic/picture would help understanding.

**Antwoord****Vrijgegeven:** 13-07-2016

Transfer of time requires an accurate measurement of roundtrip time from a master clock to a site where the clock is to be synchronized to become the slave clock. The roundtrip time divided by two is the default offset time for which the slave clock must compensate the master-clock time received in a time-stamp message from the master clock. If the route from the master to the slave differs from the route from the slave to the master, the roundtrip time divided by two contains an error and the slave clock uses the wrong offset time. The accuracy required by researchers, such as astronomers and particle physicists lies in the order of sub-ns. When a conventional bi-directional connection (two fibres using unidirectional transmission in each of the two fibres) is used a difference in fibre length of 1m already introduces a time error of 3ns, which exceeds the objective. SURFnet is not able to determine the length of each fibre of the fibre pair with sufficient accuracy (ca. 0.1m) to obtain an acceptable uncertainty in the time off-set value and consequently the slave time. Using unidirectional transmission in two fibres to determine the round-trip-time is therefore not an option. Alternatively, keeping the wave from master clock to slave clock in the same fibre as the wave from slave clock to master clock when determining the round trip time, uncertainty due to different path length (path length difference has now become zero) is eliminated. This is reason SURFnet requires bi-directional transmission per fibre span. See: '[https://www.researchgate.net/publication/290511174\\_White\\_Rabbit\\_Precision\\_Time\\_Protocol\\_on\\_Long\\_Distance\\_Fiber\\_Links](https://www.researchgate.net/publication/290511174_White_Rabbit_Precision_Time_Protocol_on_Long_Distance_Fiber_Links)' for detailed work on a test link in SURFnet's production network.

The generation of the photonic waves for this application is not part of the tender. However, Tenderer must support the adding and dropping of these bi-directional waves (single port) in Tenderer's proposal by providing a suitable architecture. Architectures that allow a clever implementation with little impact are considered more attractive.

**Nr:****Categorie** Annex\_G\_MR\_AR\_input\_form.doc**Betreft** ER32 Virtualization of Type II DWDM interfaces on the NMS

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**Vraag**

Please explain what Surfnet exactly understand under DWDM Type II.

**Antwoord****Vrijgegeven:** 13-07-2016

Type II DWDM waves originate/terminate on service platforms, such as a router or a switch or even a NFV platform. The equipment where Type II waves originate and terminate is always under management and control of SURFnet.

- Nr:**
- Categorie** Annex\_D\_TCO\_core\_model.xlsx  
**Betreft** Core network capacity matrix
- 8
- Vraag**
- There is an inconsistency in node RT001A. The traffic matrix reports the connections in green, assigning them to the transponder platform. But they are not counted in column 'AQ', but in column 'AR', as if they were Service Layer DWDM interfaces. Please clarify if these two circuits are transponder based or IPoWDWDM based
- Antwoord** **Vrijgegeven:** 13-07-2016
- This is indeed an inconsistency. The connections from node RT001A (column A) must be assigned to the transponder platform. A corrected worksheet is published together with this this information notice (Nota van Inlichtingen).
- Nr:**
- Categorie** Annex\_D\_TCO\_core\_model.xlsx  
**Betreft** Core network capacity matrix
- 9
- Vraag**
- The majority of 100G transponder based connections are individual 100G wavelengths to different nodes. For instance node DT010A has 2x 100G links, one going to DT001B and one to UT001A. Other nodes, e.g. BD001A, have 6 connections to 6 different nodes. Should we avoid grooming these connections on the same transponder linecard? For instance we could use 1x linecard supporting 2x 100G (or 2x 200G) DWDM trunk interfaces which can be connected to different node. But this would be a single point of failure. Should we avoid this or optimise cost?
- Antwoord** **Vrijgegeven:** 13-07-2016
- Single points of failure must be avoided. In due time when capacity demands exceed 100G "photonic grooming/trunking" can be considered. For example, initial deployment of one transponder per blade per direction results in a SPoF-free implementation and allows for a per degree replacement in case of failure. Future deployment of multiple transponders on a blade serving multiple directions causes proportional capacity loss over all degrees and keeps the connectivity matrix intact.
- Nr:**
- Categorie** Annex\_D\_TCO\_core\_model.xlsx  
**Betreft** Core network capacity matrix
- 10
- Vraag**
- Has the traffic matrix to be considered as unidirectional, meaning that top triangle of the matrix represent one way (e.g. A -> B) and the lower triangle of the matrix represent the return (e.g. B -> A)?  
Or do you mean that the traffic matrix is bidirectional and therefore the lower triangle means, for instance, the protected link?
- Antwoord** **Vrijgegeven:** 13-07-2016
- The matrix must be considered unidirectional. Rows indicate "from", columns indicate "to".
- Nr:**
- Categorie** Annex\_D\_TCO\_core\_model.xlsx  
**Betreft** Core network capacity matrix
- 11
- Vraag**
- As far as the Service Platform 100G DWDM I/Fs are concerned, since they are residing on the service routers, should we include them into the photonics TCO model or should they go into the L2/L3 part?
- Antwoord** **Vrijgegeven:** 13-07-2016
- No, they must not be included in the TCO. However applicable licenses must be added.
- Nr:**
- Categorie** Eisen en criteria

**Betreft** MR4 (page 31, RfP)

**Vraag**

We read this in the following way: a bidirectional connection between two node is obtained by using a fibre pair, where each fibre transport unidirectionally the traffic. E.g. Connection A  $\leftrightarrow$  B is composed by two fibres:

A  $\rightarrow$  B

B  $\rightarrow$  A

Please confirm.

Bidirectional transmission for Time and Frequency Transfer waves not clear (please see following questions)

**Antwoord**

**Vrijgegeven:** 13-07-2016

Yes, the interpretation is correct.