



**Enabling
Virtual
Access to
Latin-American
Southern
Observatories**

<http://www.evalso.eu>

Work Package: **SA1 – Link Upgrade**

Deliverable No: **SA1-1.1 ANNEX 6**
**Technical Specification for the
procurement of the EVALSO
optical infrastructure**

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Abstract

This document defines the technical specification for the procurement of the optical links to connect the Observatories (ESO/Paranal, RUB/OCA) REUNA Antofagasta, ESO/Santiago, and REUNA/Santiago.

The procurement is executed by ESO.

¹ nature of the deliverable: **R** = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

² Dissemination level **PU** = Public

PP = Restricted to other programme participants (including the Commission Services).

RE = Restricted to a group specified by the consortium (including the Commission Services).

CO = Confidential, only for members of the consortium (including the Commission Services).

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LIST OF ABBREVIATIONS

ADSS	All Dielectric Self Supported (fibre cable)
CfT	Call for Tender
IRU	Indefeasible Right of Use
MPLS	Multi Protocol Label Switching
N/A	Not Applicable
OCA	Observatorio Cerro Armazones
PoP	Point of Presence
SLA	Service Level Agreement
TELCO	Telecommunication Company/Provider that will provide, at the very minimum, the Fixed Wavelengths (one Lambda) between Antofagasta and the Santiago areas
UPS	Uninterruptible Power Supply

1 PURPOSE AND SCOPE

This document defines the technical specification for the procurement of optical paths making up the EVALSO optical infrastructure intended to serve:

- the Observatories: ESO/Paranal and RUB/OCA
- REUNA Antofagasta,
- The end points: ESO/Santiago and REUNA/Santiago.

The procurement of this infrastructure is part of the FP7 – EVALSO project and it is executed by ESO.

In order to allow the best mix of capability among different providers to achieve the best performance/price condition, the whole infrastructure is divided in the following items:

1. ESO/Paranal to REUNA/Antofagasta
2. REUNA/Antofagasta to Santiago
3. Hosting space in Santiago
4. OCA to ESO/Paranal
5. Santiago to end points (ESO/Vitacura and REUNA/Providencia)

The contracts for the requirements set out in this Technical Specification may be awarded wholly, in part or not at all to any specific tenderer. Final contracts (if any) will be awarded directly by ESO and/or other EVALSO members.

Not in the scope of this procurement is the equipment to connect and serve the communication at all served locations. Such procurement will be carried over separately by another EVALSO member (REUNA).

1.1 Applicable documents

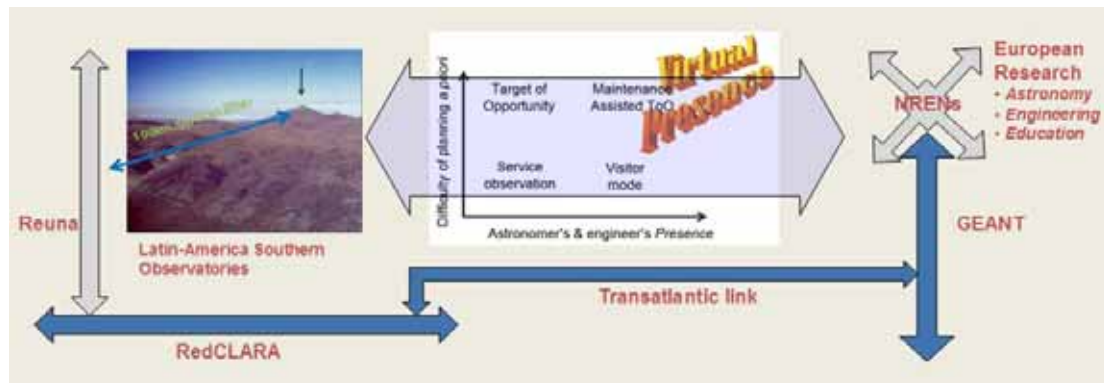
The following applicable documents form part of the present document to the extent specified herein. In the event of conflict between applicable documents and the content of the present document, the content of the present document shall be taken as superseding.

AD1 EVALSO-SA1-1.2 Area Survey

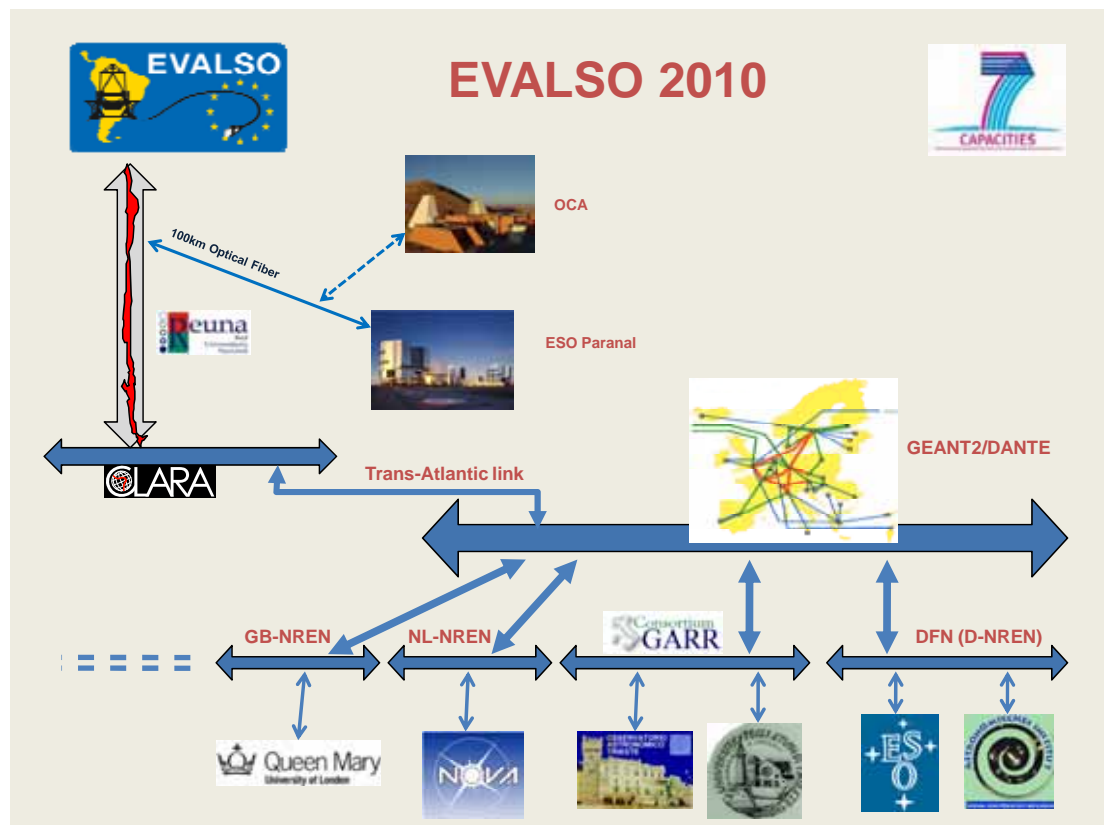
2 BACKGROUND INFORMATION

2.1 The EVALSO Project

The EVALSO (Enabling Virtual Access to Latin-American Southern Observatories) Project aims to create a physical infrastructure (and the tools to exploit it) to efficiently connect the ESO Very Large Telescope VLT at Cerro Paranal and the RUB OCA Observatories at Cerro Armazones to Europe, more specifically to the European Research and Education network through its Latin American similes REUNA and CLARA.



The infrastructure will use international infrastructures created in the last years with the European Commission EC support (RedCLARA, GEANT) to provide European Research a competitive edge having faster access to the collected data and use the facilities in an ever more efficient way.



The EVALSO Project is an activity funded under the European Commission FP7 (Seventh Framework Program) on Research Infrastructures, Grant Agreement Nr. 212891.

EVALSO is run by a consortium made by a number of European and Latin America institutions:

- Università degli Studi di Trieste (Italy)
- European Organisation for Astronomical Research in the Southern Hemisphere
- Ruhr-Universität Bochum (Germany)
- Consortium GARR (Italy)
- Universiteit Leiden (The Netherlands)
- Istituto Nazionale di Astrofisica (Italy)
- Queen Mary and Westfield College, University of London (United Kingdom)
- Cooperación Latino Americana de Redes Avanzadas (Uruguay)
- Red Universitaria Nacional (Chile)

One of the key objectives of the EVALSO project is to improve the connectivity of two Astronomical Observatories in Chile:

- ESO's Cerro Paranal Observatory
- RUB's Observatorio Cerro Amazonas (OCA)

Both Observatories are located in the region south of Antofagasta. The connectivity to the world-wide research internet is currently based on a microwave link, but it is recognized that a much higher capacity, more reliable link will be required for the research purposes of the international scientific community in the area.

Because of the lack of infrastructure in the region, it has been decided to:

- Improve the communication infrastructure between the Observatories and the nearby existing infrastructures
- Provide higher bandwidth to connect to the Chilean research network (REUNA) and the international research backbones

Further information at <http://www.evalso.eu>

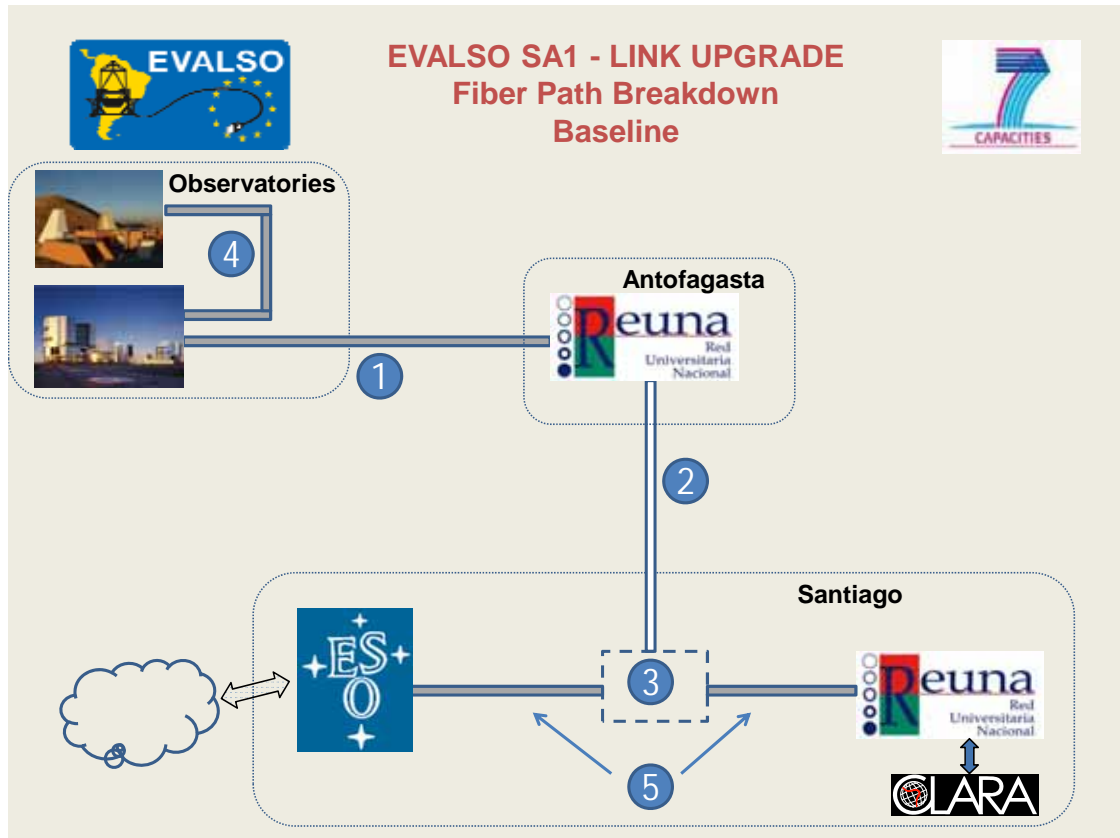
2.2 Locations and sites

The description of the interested areas is provided in [AD1] (SA1-1.2 Area Survey).

It is assumed that the reader of the present document is familiar with the names and locations described in such document.

3 THE EVALSO OPTICAL INFRASTRUCTURE

The whole system has been divided in items according to the following schema:

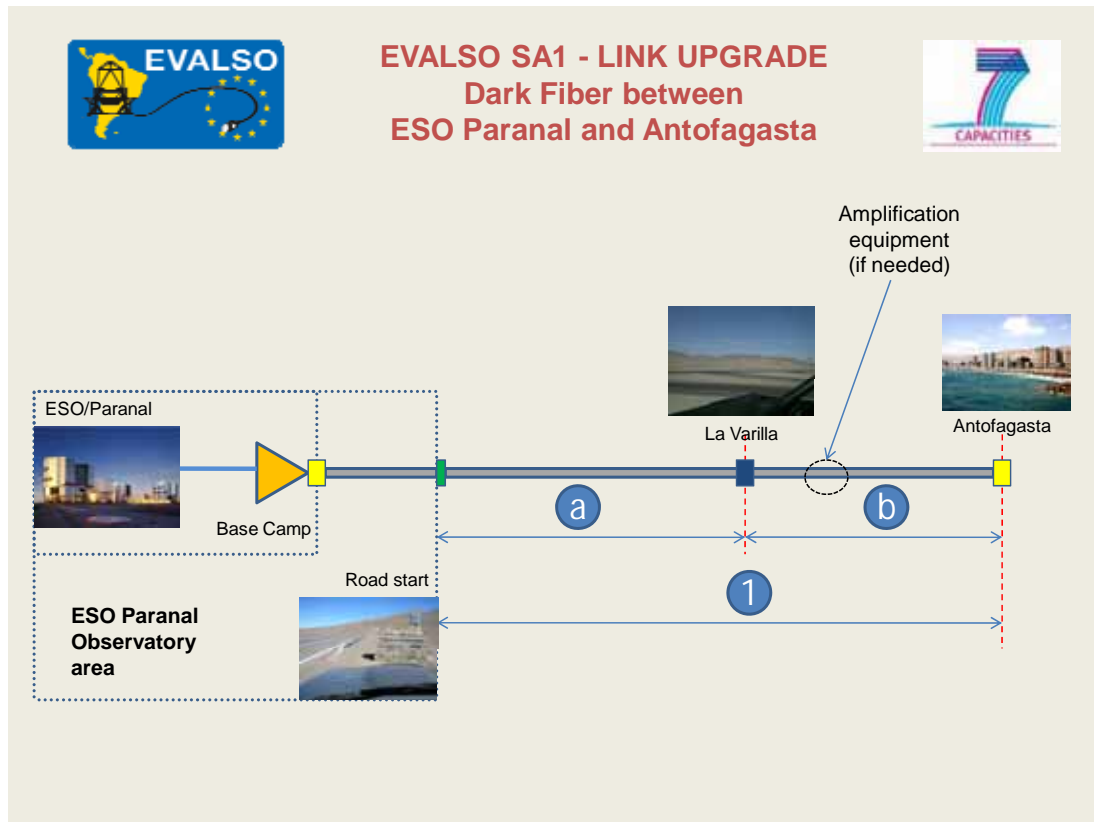


The identified items are:

- Item 1: Dark Fibers between ESO Paranal and REUNA Antofagasta
- Item 2: Fixed Wavelengths (one Lambda) between REUNA Antofagasta and the Santiago area (TELCO PoP)
- Item 3: Housing space for EVALSO equipment at the TELCO PoP (Santiago)
- Item 4: Dark Fibers between OCA and ESO Paranal
- Item 5: Dark fiber between TELCO PoP and the end points in Santiago, namely ESO/Vitacura and REUNA/Providencia

In the following sections, each item will be discussed in details.

3.1 Item 1(a+b): Dark Fibers between ESO Paranal and REUNA Antofagasta



Item 1 is the optical connectivity using a dark fiber pair between ESO/Paranal and REUNA location in Antofagasta.

Considering that there are no existing fibers within several tens of kilometers from Paranal, but instead there are existing fiber infrastructures around Ruta 5, it is assumed that Item1 will be the composition of:

- A fiber pair from a new optical cable to be installed between the road start⁴ of Paranal and a location along Ruta5. Considering the B710 “old-Panamericana” as the more natural path to follow, the join location reference position is located at the La Varilla crossroad.
- The use of an existing fiber pair out of an installed optical cable.

Accordingly, Item1 has been structured in two sub-items:

⁴ The connectivity between Paranal road start and Paranal base camp is not in the scope of the present Call for Tender and will be delivered by ESO as result of a separate procurement.

Item1a: the new fiber between ESO/Paranal and the starting point of the existing infrastructure, defined as:

- A set of:
 - 4 dark fibers (2pairs)
 - or 8 dark fibers (4pairs)
 - or 12 dark fibers (6pairs)
- Starting point: within 100m radius from the stone pillar indicating the start of the current private road to the ESO Paranal Observatory, branching off the B710.
- End point: (see further information at the end of this section)
 - (for Bidders offering only 1a) within 1km radius from the La Varilla crossroad.
 - (for Bidders offering also 1b) the actual start point of Item1b.
- Fibers will be terminated:
 - At starting point: At starting point: on a Patch panel in a protective sub-surface cabinet to be installed close to the private road start. Exact position will be defined by ESO prior of the start of the Contract. The sub-surface cabinet has to allow a minimum space of 12U free, and allow for the termination of additional FO cabling via sub-surface ducts for two additional locations:
 - PAO Site
 - OCA Site
 - At end point: not connected⁵, but left as loose end with:
 - Connectors to allow testing and measures.
 - Suitable protection from environment and accidental handling.
 - At least 10 m of spare length.
- Fiber shall comply or be superior to requisite as in Annex A.
- Any installation along the private road must be concealed and not visible to someone who is driving on that road.
- The right for ESO or any other EVALSO Member to connect optical circuits along the path (i.e., Item4 or future installations in the area) to access the procured fibers. Appropriate design has to ensure the feasibility of such connection with minimum disruption and costs.

Item1b: (the existing infrastructure that can be re-used to complete the optical path up to the Antofagasta area), defined as:

- A pair of dark fiber complying or superior to requisite in Annex A
- Starting point: as defined by the Bidder

⁵ The physical connectivity to the existing fiber is in 1b scope.

- End point: at the REUNA Data Center in Antofagasta located at Universidad Católica del Norte in Av. Angamos 0610, Antofagasta.
- Fibers will be terminated:
 - At starting point: by connecting the cable provided by 1a to the existing infrastructure. Connection (splicing, patch panel, etc) depends on the nature of the existing infrastructure and it is in the scope of 1b.
 - At end point: on a patch panel to be installed in a rack space within the REUNA Data Center
- Any needed equipment for signal regeneration that may be necessary, considering also the attenuation due to Item1a (according to fiber requirements in Annex A)

Please notice that according to the above definition Item1 (a+b) constitutes a continuous optical path without any traffic management in between the two end points.

Depending on their existing infrastructure, Bidders can opt to offer for:

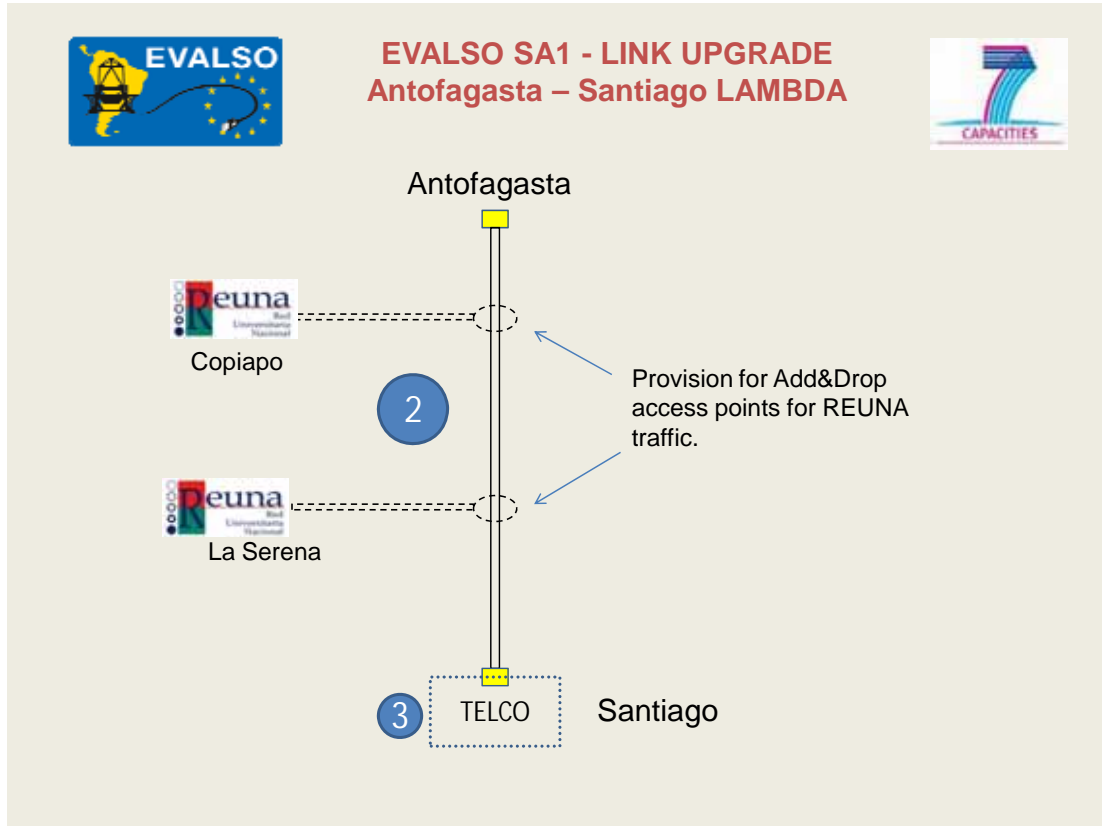
- **The whole Item1 (a+b).** In such case, neither the connection point in La Varilla nor the path along the old-Panamericana are mandatory requirements. Any other topology can be proposed, providing that:
 - The connection point is clearly identified and specified (location, technical characteristics of the connection method, specification of the fiber, etc)
 - A complete technical description of the intended 1a and 1b infrastructures (path, type of fiber/cable, planned attenuation, need for signal regeneration, etc).
 - Although part of the same Item, 1a and 1b are quoted separately and can be independently selected (i.e., ESO reserves the right to procure only 1b or only 1a or both)
- **Only Item1a.** In such case, the Bidder should assume start and end point as defined above (ESO road start to La Varilla) and, under such assumption, provide:
 - A complete technical description of the intended 1a infrastructures (path, type of fiber/cable, planned attenuation, etc).

In such case, the offer will require to be updated as soon as the actual start of 1b is known, assuming the overall characteristics of the line has not changed (type of terrain, etc), with the only exception of the total length. If instead the overall topology and characteristics have change significantly with respect to the baseline defined in this document for Item 1a, a new CfT may be necessary.

- **Only Item1b.** In such case any connection point can be proposed, providing that:

- The connection point is clearly identified and specified (location, technical characteristics of the connection method, specification of the fiber, etc)
- A complete technical description of the intended 1b infrastructures (path, type of fiber/cable, planned attenuation, need for signal regeneration, etc).

3.2 Item 2: Fixed Wavelengths (one Lambda) between REUNA Antofagasta and the Santiago area (TELCO PoP)



Item 2 is the optical connectivity using a Fixed Wavelengths (one Lambda) between the REUNA location in Antofagasta⁶ and the TELCO PoP in Santiago.

Accordingly, Item2 is defined as:

- A dedicated standard lambda foreseen in the WDM schema. The lambda must be able to transport transparently the ITU-T G.709 OTU1 Digital Wrapper protocol (2.5Gbps). The use of higher level of the same standards (OTU2 Digital Wrapper protocol, 10Gbps) is also acceptable, providing that the circuit maintains the full functionality of a transparent lambda.

As a consequence of the above, a “virtual lambda” will NOT be an acceptable offer for the baseline.

⁶ Or the TELCO PoP in Antofagasta, if the optional schema is used. See Appendix 6 for more.

- A portion of dark fibers needed to connect the Bidder WDM equipment at both ends to the physical access point (patch panels) in Antofagasta and Santiago
- Starting point: racking space provided at the REUNA Data Center in Antofagasta
- End point: racking space at the TELCO PoP in Santiago (see 3.3)
- Fibers will be terminated:
 - At starting point: on a patch panel
 - At end point: on a patch panel

3.2.1 Provision for possible Add&Drop nodes in Copiapo and La Serena

As one of the objectives of the EVALSO project is the creation of synergies between the international and national academic network, it is planned to optimized the use of the new communication infrastructure among the EVALSO members, and for this reason there is the obvious interest to open the structure to other areas.

Therefore, in addition to the above technical requirement, the Bidder is asked to show the capability and to include as part of the offer all needed provision for the possible future creation of access point to the Lambda (modality Add&Drop) in the areas of Copiapo and La Serena.

Such right may be exercised at any moment during the duration of the Contract by REUNA. All costs implied by the creation of such points for hosting, additional equipment, etc. are not in the scope of this tender and have not to be included in the quotation, but a budgetary estimation is requested as part of the technical description of the solution.

The technical requirement for such intermediate insertion points are:

- Detailed information on the availability of the access point in the Copiapo and La Serena urban areas (location, size, type of equipment, technical considerations on extract/reinsert the Lambda, etc)
- Commitment to provide housing space for the installation of equipment (Racking space min 20U, 3kW UPS power, appropriate cooling, 24x7 access right, access requirements/restrictions, remote hand for basic task (turn off/on an equipment), etc)
- The right to access the housing space mentioned above to connect dark fibers from third party if needed.

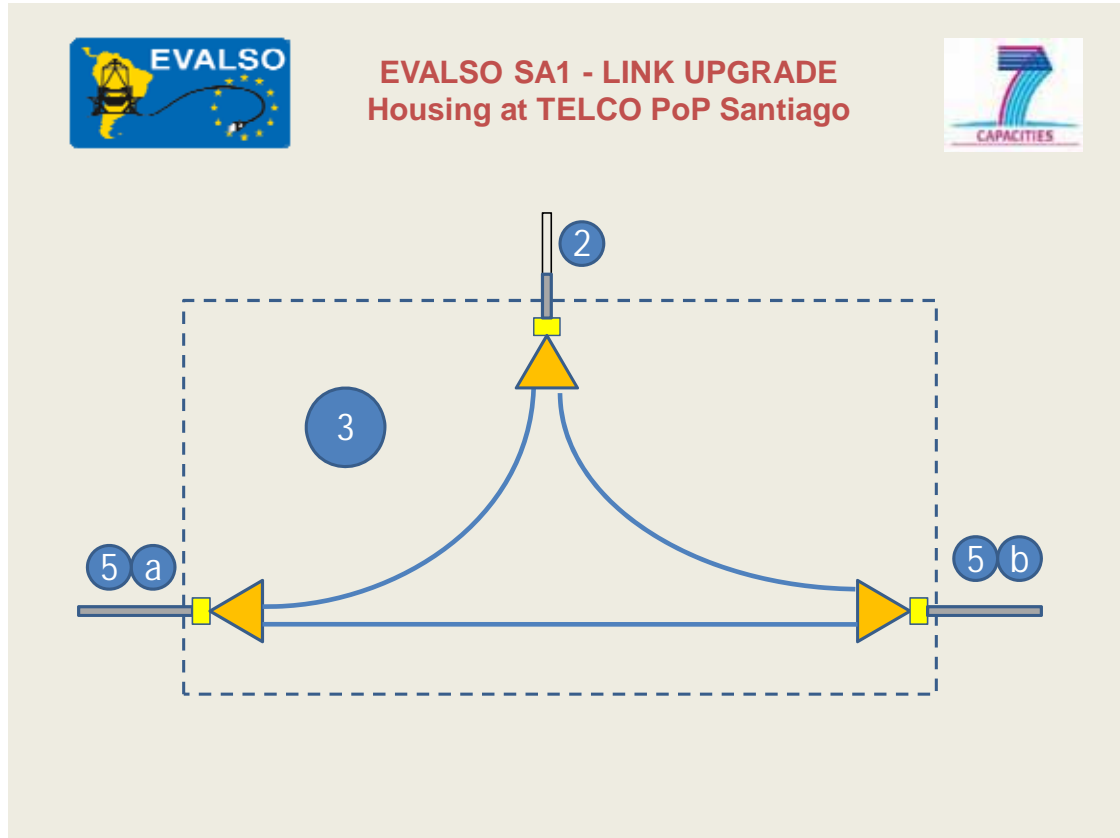
For information, the planned end points are the REUNA Data Centers located respectively at O'Higgins 531 Copiapo and at Av. Benavente 980 La Serena.

3.2.2 Planned technological evolution

Due to technology evolution it is expected that during the contract time, upgrades may become available in the Bidder infrastructure (e.g., upgrade of OTU1 to OTU2). If, for easier operations, the same upgrade should apply to Item2 too, the Bidder can submit a request at any moment to ESO to offer at no extra charge to extend the benefit of such upgrade against the upgrade of the end equipment to cope with the new situation. End equipment upgrade costs are not in the scope of the present tendering process.

In no case, upgrades of the infrastructure can change the peculiar characteristics of a dedicated Lambda (e.g., changing to a managed traffic of same capacity on MPLS or similar technology).

3.3 Item 3: Housing space for EVALSO equipment at the TELCO PoP

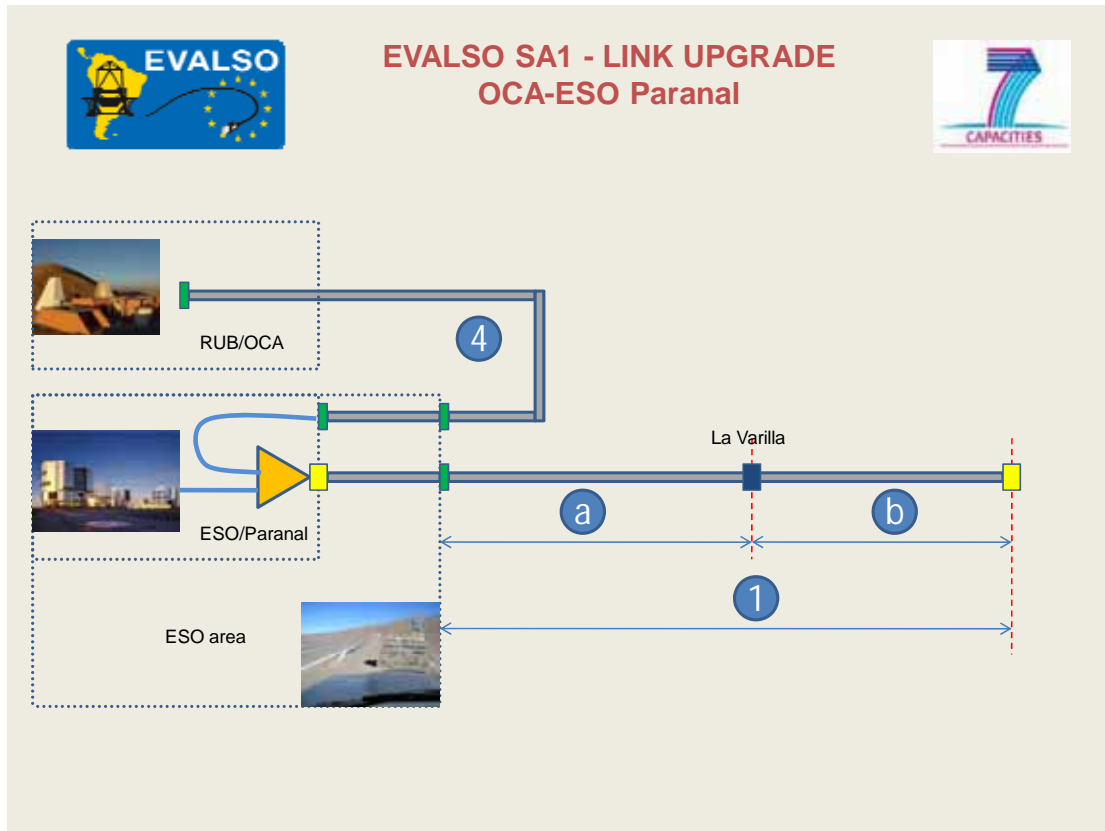


Item3 is the housing space at the TELCO PoP in Santiago available to install the equipment (muxponders) needed by the EVALSO project to distribute the traffic flows carried over the LAMBDA (Item2) to the end points in the Santiago area, namely ESO/Vitacura and REUNA/Providencia.

Accordingly, Item3 is defined as:

- Standard 19-inch Racking space with:
 - min 20U free,
 - 3kW UPS power,
 - appropriate cooling,
 - 24x7 access right, access requirements/restrictions, etc)
 - Remote hand service for basics task (turn on/off equipment)
- A patch panel where the final part of dark fiber coming from Item2 is connected.
- the right to access the assigned space through the Bidder infrastructure to connect the dark fibers 5a and 5b (see 3.5), if procured from third party

3.4 Item 4: Dark Fibers between OCA and ESO Paranal



Item 4 is the dark fiber between OCA and the start point of the road to ESO Paranal. It is expected that to do this connection, the most economical way is to lay down a new segment of fiber cable to connect the OCA Observatory to the closest access point to the Item 1a new cable. At that point, by using one of the Item1a pairs, the signal can be carried to the ESO Paranal where the two communication flows can be merged and send to the REUNA PoP in Antofagasta.

Depending on the path of Item 1 the connection point could be:

- If the connection point is on Ruta5 northern of OCA and the new cable is laid parallel to the B710, probably the easiest way is to get from OCA to the B710 road along an existing path trace that start from the current branch off point from the B710 of the unpaved road to OCA, and there connect to some of the 1a fibers in the new cable back to ESO Paranal.
- If the connection point is on the other side of S.rra Makenna and the new cable goes through the mountains passing nearby the current OCA site, probably the easiest way is to get from OCA to the cable along the mountain ridge, and then merging into the new cable.

In both cases, the signal is brought back to Paranal to be merged with ESO traffic.

Accordingly, **Item4** is defined as:

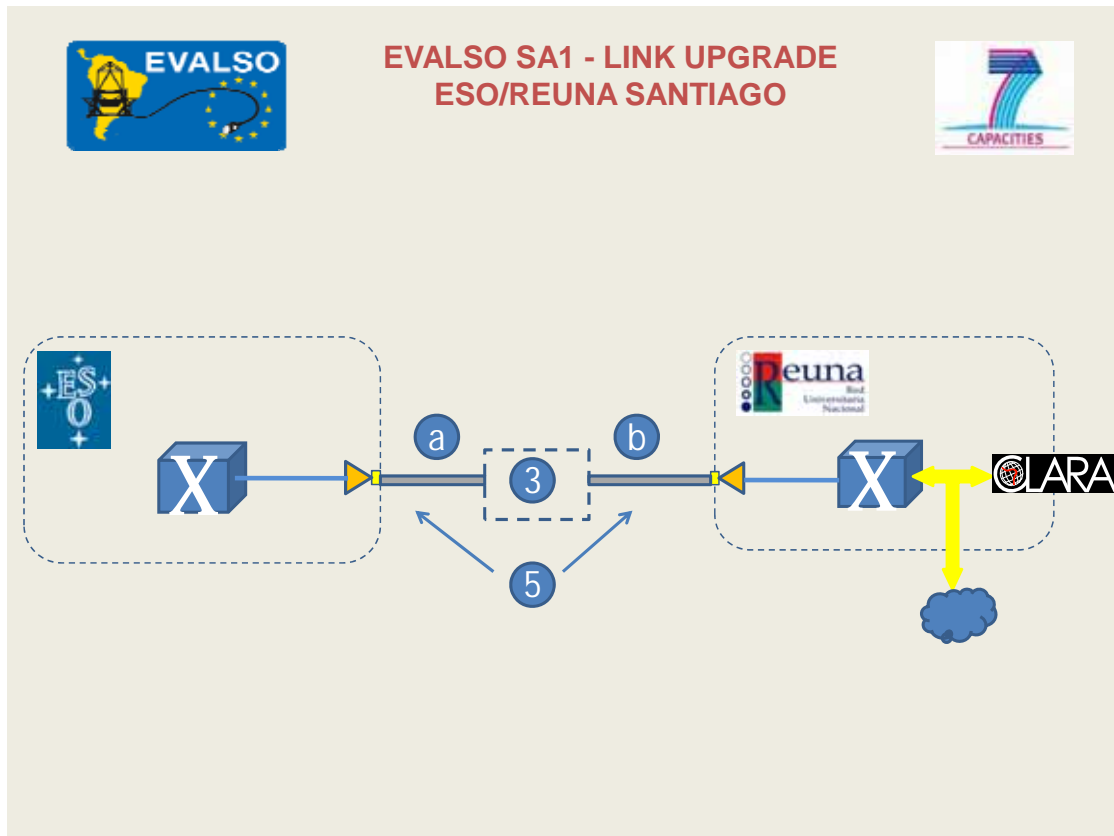
- A set of minimum 4 dark fibers (2pairs) to connect in the most convenient way to the existing Item1a (see 3.1)
- Starting point: OCA telescope installations
- End point: same as starting point of Item1a (see 3.1)
- Fibers will be terminated:
 - On a Patch panel installed at OCA at starting point
 - On a Patch panel installed in the cabinet as from Item 1a (see 3.1)
- Fiber shall comply or be superior to requisite as in Annex A

Item4 may be procured independently by ESO or OCA.

Item4 may not be procured at all. As alternative option, Bidders are invited to provide budgetary quotation for a microwave link (min 50Mbps) or other appropriated technology capable of connecting directly the two Observatories (they are on line of sight).

Although Item4, strictly speaking is an independent object and could be, in principle, be implemented not as an optical path, it is important that the layout of Item 1(a+b) tries to optimize the overall cost of the infrastructure.

3.5 Item 5(a+b): Dark fiber between TELCO PoP and the end points in Santiago, namely ESO/Vitacura and REUNA/Providencia



Item5 is a set of dark fibers connecting the housing at the TELCO PoP in Santiago (arrival point for the Lambda) to, respectively, ESO/Vitacura and REUNA/Providencia.

Accordingly, Item5 has been structured in two sub-items:

Item5a: dark fiber between TELCO PoP and ESO Data Center at the ESO offices in Vitacura, defined as:

- One uninterrupted pair of dark fibers connecting the two end points
- Starting point: TELCO PoP housing space (as from 3.3)
- End point: ESO Data Center at the ESO offices in Vitacura.
- Fibers will be terminated:
 - On a Patch panel to be installed at the TELCO PoP.
 - On a Patch Panel to be installed at ESO Data Center

- Fiber shall comply or be superior to requisite as in Annex A

Item5b: dark fiber between TELCO PoP and REUNA Data Center in Providencia, defined as:

- One uninterrupted pair of dark fibers connecting the two end points
- Starting point: TELCO PoP housing space (as from 3.3)
- End point: REUNA Data Center (Canadá 239 Providencia, Santiago)
- Fibers will be terminated:
 - On a Patch panel to be installed at the TELCO PoP.
 - On a Patch Panel to be installed at REUNA Data Center
- Fiber shall comply or be superior to requisite as in Annex A

The two items may be procured independently by ESO and or REUNA, as the result of the present call for tender or as a separate independent procurement.

4 SCOPE OF PROCUREMENT

4.1 Items and options identification

In order to allow the best mix of capability among different providers to achieve the best performance/price condition, the whole infrastructure is divided in items according to the technical description in section 3. For some of items, more options may be defined, as from the following tables.

ITEM1a	<i>Two or more Dark Fiber pairs between ESO Paranal and the connection point to Item 1b, according to the technical requirement as from 3.1</i>
<i>Options</i>	
A1	10year IRU for 4 dark fibers (2pairs)
A2	10year IRU for 8 dark fibers (4pairs)
A3	10year IRU for 12 dark fibers (6pairs)
B1	15year IRU for 4 dark fibers (2pairs)
B2	15year IRU for 8 dark fibers (4pairs)
B3	15year IRU for 12 dark fibers (6pairs)
C	Full ownership of a fiber infrastructure with minimum 12 fibers (6pairs)

ITEM1b	<i>One Dark Fiber pairs between the connection point to Item 1a and the REUNA Antofagasta, according to the technical requirement as from 3.1</i>
<i>Options</i>	
A	10year IRU
B	15year IRU

ITEM2	<i>Fixed Wavelength (one Lambda) between Antofagasta and TELCO PoP in Santiago, according to the technical requirement as from 3.2</i>
+	
ITEM3	<i>Housing space for EVALSO equipment at TELCO PoP in Santiago, according to the technical requirement as from 3.3</i>
<i>Options</i>	
A	10year IRU ITU-T G.709/OTU1 (2.5Gbps) or OTU2 (10Gbps)
B	15year IRU ITU-T G.709/OTU1 (2.5Gbps) or OTU2 (10Gbps)

ITEM4 <i>Options</i>	<i>Two Dark Fiber pairs between OCA and ESO Paranal, according to the technical requirement as from 3.4</i>
A	10year IRU for 4 dark fibers (2pairs)
B	15year IRU for 4 dark fibers (2pairs)
C	Full ownership of a fiber infrastructure with minimum 12 fibers (6pairs)

ITEM5a <i>Options</i>	<i>One Dark Fiber pairs between TELCO PoP in Santiago and ESO Vitacura, according to the technical requirement as from 3.5</i>
A	10year IRU
B	15year IRU

ITEM5b <i>Options</i>	<i>One Dark Fiber pairs between TELCO PoP in Santiago and REUNA Providencia, according to the technical requirement as from 3.5</i>
A	10year IRU
B	15year IRU

4.2 Patch panels and connectors

For all Items, unless explicitly said, the following apply:

- All patch panels in the scope of each item have to be provided as part of the item delivery
- Standard patch panels shall be used, namely:
 - 19-inch rack mounted, 2U maximum height, including cable wrap,
 - minimum 12 connectors of type ST

The connectors on the provided patch panel are also the

- test point for functional and acceptance test
- the technical and contractual interface of each delivered item.

4.3 Accessibility

For all Items, unless specific conditions are stated in the technical specification in Section 3, the following apply:

- The exact location, routing of cables, position of racks, etc will be defined as part of contract refinement to take place before contract start.
- For housing at TELCO PoP(s) it is request to provide
 - 24x7 contact point (phone)
 - 24x7 access right for servicing EVALSO equipment for emergency repairs
 - access right for servicing EVALSO equipment for ordinary maintenance within agreed time windows
 - Remote hand service for basics task (turn on/off equipment)
 - the right to access the assigned space through the Bidder infrastructure to connect dark fibers, if procured from third party
- For housing at ESO or REUNA premises it is given:
 - 24x7 contact point (phone)
 - 24x7 access right for servicing EVALSO infrastructure for emergency repairs
 - access right for servicing EVALSO infrastructure for ordinary maintenance within agreed time windows
 - the right to access the assigned space through ESO/REUNA premises to connect dark fibers.

All above aspects will be part of the technical refinement to be done before Contract start. Considering the relative minor importance of all such aspects, no cost impact can be claimed because of this refinement.

4.4 Maintenance

For all items, as appropriate, preventive and corrective maintenance activities have to be detailed described in the technical proposal, including:

- 24x7 contact point
- Type and qualification of the maintenance structure (people, equipment, etc) that the bidder intent to use
- Maintenance oriented design considerations (spares, redundancy, availability, etc)
- Type and frequency of preventive maintenance. Need to host at ESO/OCA/REUNA Bidder's equipment to support maintenance activities

All maintenance action must be planned in agreement with all parties and at least with one months notice.

4.5 Service Level Agreement (SLA)

4.5.1 Service parameters and target values

For all optical paths, the following SLA parameters are defined:

Unavailability: as the maximum time where the system is not available due to preventive or corrective maintenance over a continuous period of 12 months.

Maximum duration of a single downtime measured from the time a problem is reported to the provider to the full and stable re-establishment of the service. For period of interrupted or unstable service, including micro-interruptions, the downtime duration is calculated from the first occurrence till effective solution, even if the system may be partly usable in between.

The following table details the required values for the above parameters.

Item	Maximum unavailability over a consecutive period of 12 months	Maximum duration of a single downtime
Item1a fibres	36 hours	24 hours
Item1b fibres	24 hours	24 hours
Item2	16 hours	8 hours
Item5a/b fibres	16 hours	4 hours

4.5.2 Downtime log and SLA report

Each provider has to keep a log of all downtimes, whether planned or unplanned, and it is due to provide an SLA report every 6 months on the service parameters and actual values, including a list of all occurred events and for each event:

	Unplanned Downtime	Planned Downtime
Start time	When the problem is reported to the provider	Start of planned Maintenance
End time	when the service has been re-established to it full and stable status	End of planned Maintenance
reason	Root cause of the problem	Maintenance Goal
activity	What done to solve it	Maintenance activity/ies
Remedy action	(if any) Possible remedy actions planned to reduce the probability that similar event/needs may re-occur	

4.6 Delivery schedule

Although a firm requirement for delivery date is not set, the project expect a complete delivery within 6 to 9 months from Contract signature. A detail delivery schedule has to be delivered as part of the Technical Proposal. Without impacts on the economical terms, an early delivery is considered a plus.

4.7 Additional Conditions

ESO runs the tendering process but reserves the right to:

- Procure the additional items (4, 5a, 5b) as result of this CfT or from another one
- Transfer the execution of the final procurement to one of the other EVALSO members (i.e., 4 by RUB, 5b, by REUNA)
- To split the procurement of 1a and 1b and have the 1a built and owned by ESO up to the point indicated by the 1b supplier.

In addition to the baseline configuration, Bidders can propose completely different schema as alternative proposals, providing that they are technically and functionally equivalent to what described in section 3 and that all technical information (structure, locations, equipment, etc) are clearly detailed to allow the technical evaluation to assess compliance to the key requirements. An example of alternative approach is outlined in Appendix D.

In addition, Tenders have to agree explicitly that all technical material delivered to ESO as reply to this CfT can be disclosed to other EVALSO members that will have representatives in the technical evaluation committee.

4.8 Restriction of use

The procured items will be used solely for the current or future education and scientific purposes of the Organizations involved. No third parties can have access unless explicit written agreement from the selected provider(s).

4.9 Dissemination and public outreach

Considering that the primary goal of the EVALSO infrastructure is to foster the general scientific and education progress, the project welcomes and supports any dissemination activities that may benefit either the Providers and/or the EVALSO project members.

To allow traceability, any outreach activity mentioning the project shall be prior authorized by one of the EVALSO member and will always have to carry clear identification of the EVALSO project and the FP7 program logos, namely⁷:



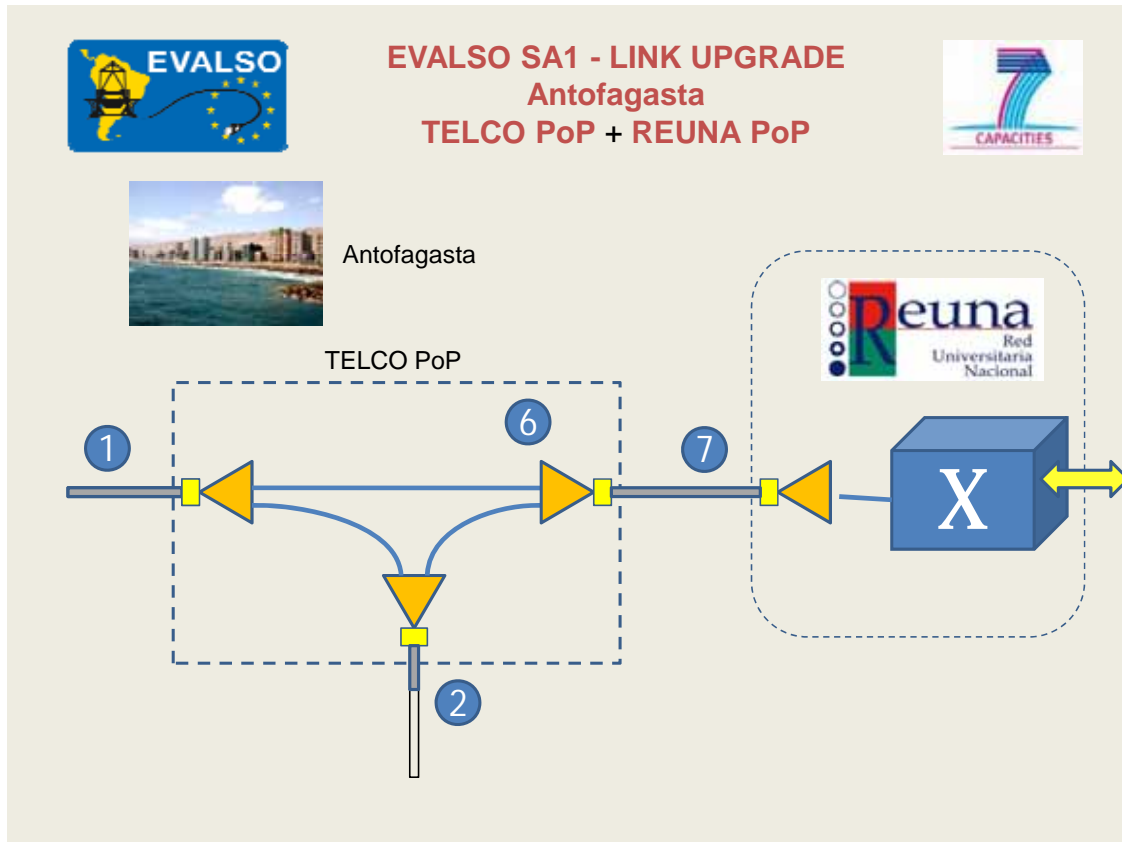
⁷ Electronic version of the pictures will be provided at Contract signature.

5 Annex A – Technical requirements for Item1a fibers

Item1a fibres	Monomode optical fiber with NZ-DSF, standard ITU G655, 1550nm, power loss ratio lower than 0,3dB/Km average including splicing and terminations.
Item1b fibres	Monomode optical fiber fully suitable to transport an ITU-T G.709 OTU1 or OTU2 digital wrapper protocol, power loss ratio lower than 0,3dB/Km average including splicing and terminations.
Item5a/b fibres	Monomode optical fiber fully suitable to transport an ITU-T G.709 OTU1 or OTU2 digital wrapper protocol, power loss ratio lower than 0,3dB/Km average including splicing and terminations.

The values have to be proven by design and verified by measures at system acceptance.

6 Annex B – Possible alternative connectivity in Antofagasta



As additional option to the direct connectivity for Item1 and Item2 to the REUNA offices in Antofagasta, Bidders may consider the possibility to create a dedicated housing in between, as in the picture.

Should that be the case, both technical and economical advantages have to be highlighted and the additional proposal should be structured accordingly, using for instance, the following references:

Item6: housing space for EVALSO equipment at the TELCO PoP in Antofagasta Area, defined as:

- Standard 19" Racking space with:
 - min 20U,
 - 3kW UPS power,
 - appropriate cooling,
 - 24x7 access right, access requirements/restrictions, etc)
 - Remote hand service for basics task (turn on/off equipment)
- A patch panel with at least 12 ST-connector type where the dark fibers coming from Item1 and Item2 are connected. Remaining connectors are free and available for use.

- the right to access the assigned space through the Bidder infrastructure to connect the dark fibers from Item7 (see 3.5), even if procured from third party

Item7: dark fiber between TELCO PoP and REUNA Data Center in Antofagasta, defined as:

- One uninterrupted pair of dark fibers connecting the two end points
- Starting point: TELCO PoP housing space (as from Item6)
- End point: REUNA Data Center located at Universidad Católica del Norte in Av. Angamos 0610 Antofagasta
- Fibers will be terminated:
 - At starting point: on a Patch panel.
 - At end point: on a Patch Panel
- Fiber shall comply or be superior to requisite as in Annex A