RFI (Request for Information) for Transport and multiservice IP/MPLS network Modernization

Main objective of these technical requirements is to define the general functional requirements for Transport and IP/MPLS network modernization in period 2016-2018.

The modernization is mainly driven by

* the life cycle of the existing equipment IP and DWDM and the limitation of the existing transport and IP network in terms of capacity and functions
* by new technical requirements for the integration of HSPA+/LTE mobile network and advanced mobile IP services over existing IP/MPLS infrastructure which currently supports fixed services only

1. **General requirements**
   1. Solution provider should provide detailed technical solution/network topology for the offered equipment with all included requirements
   2. Solution provider should follow the existing architecture and provide:

* Higher availability and flexibility
* Reduce network complexity
* Higher redundancy of connections
  1. Offered solution has to comply with the latest versions of all valid ITU-T, IETF, IEEE or ETSI standards.
  2. Solution provider should provide with technical documentation, prices for HW, installation and maintenance for all types of offered equipment.
  3. The subject of the technical solution should be:
* pricing (HW, SW, licenses, spare parts, testing, installation and integration, Low Level Design preparation, training, support and maintenance)
* technical specification of the offered equipment, including SoC (Statement of Compliance) answers
* description of the proposed technical solution
* detailed project plan in phases
* maintenance and equipment operating procedures

1. **Pricing** 
   1. Solution provider shall provide unit price for each part/network offered as well as price summary for the total offered installation in Euro currency. (HW and SW, installation and integration activities)
   2. Solution provider may express the price for installation and maintenance of equipment in different ways, for example.

* percentage of total value of the equipment,
* unit price per component,
* unit price per working hour plus real costs for installation materials,
* other

1. **Delivery, installation and maintenance**
   1. Solution provider should specify the scenario for delivery time and conditions of the offered equipment after the signing of the Contract.
   2. Solution provider shall specify scenario for installation and integration of the proposed Transport and multiservice IP network.
   3. Solution provider should offer ”Turn-key” implementation
   4. Solution provider should be responsible for installation, integration and interoperability with the existing network and supervision of installation and integration process.
   5. Solution provider should include in the offer optimal spare-parts quantity depending on declared MTBF parameters and total number of installed equipment.
   6. The Solution provider has to have local team. The following data has to be stated:

* personnel teams of the company - number of employees, certificates and working experience providing support, organizational structure and number of employees that would directly support implementation activities.
  1. Solution provider has to include five years maintenance of all products stated in the offer
  2. Solution provider should offer 24x7 support level with on-site response time of 2 hours the capital city and 4 hours in all other cities
  3. Solution provider should guarantee 16 hours recovery time response (the moment when the network is returned back to near-normal operating conditions) in situations when network is down or there is a critical impact to the operation
  4. The closing time should not be more then 3 months – this involves the time that elapses from the time of reporting the problem to the point where the fix via upgrade is available.
  5. Solution provider should provide software maintenance proposal - regular maintenance and operating system upgrades
  6. Solution provider should provide the pricing and conditions for payment of the proposed support for 3 years

1. **Proof of Concept Testing**
   1. Solution provider should deliver equipment free of charge in the customer premises in order to perform proof of concept before final acceptance of the offer.
   2. Solution provider should specify the Acceptance test procedures for proof of concept. These procedures will provide proof that the required functionalities are valid via test plan steps, methods measurements tools and expected results. Acceptance tests have to prove end-to-end functionality of the integrated system. Passing criteria will be mutually agreed prior to the acceptance of test plan.
   3. The performance tests shall be conducted together with the customer and solution provider experts, in compliance with the technical requirements and technical specification of the equipment given by the solution provider.
2. **Training**
   1. Solution provider should submit complete knowledge transfer program for free that can be organized in relation with the installation, usage and maintenance of the equipment and software consisted in the offer. The list should contain the following data:

* Description of the knowledge transfer program
* Duration of the knowledge transfer program
* Venue and dates for the knowledge transfer course
* Minimum-maximum number of participants for whom the knowledge transfer will be organized
* Possibilities for performing the knowledge transfer at another location and outside the terms given in the requirements
* Prerequisities for the training and credentials received by the participants after completion of the training program
* In case of on site training the Solution provider shall provide trainer experience and qualification
* Knowledge transfer has to be perform by certified company/trainer

1. **Current IP/MPLS network description**
   1. IP/MPLS network is implemented in a meshed ring and hub-spoke topology with 4 core routers (2 routers in the capital city and 2 routers in the eastern part of the country in two different but neighboring cities) interconnected via multiple 10GE links in a LAG in a rectangle way, and aggregation level consisted from 25 PoP routers (20 Large and 5 Small) double connected to the first or second pair of the core routers. Both large and small aggregator's platform is a single redundand PE router. Uplink connections to core routers are redundant and all of them are connected with 1x10GE links in case of large PoP and GE links in case of small PoP.
      1. The capital core routers terminates:

* 2x 10GE rings consisting of 3 PE routers (6x large PoPs)
* 1x GE ring consisting of 3 PE routers (3x small PoPs)
* 4x single dual-connected PE routers (4x large PoPs)
* Data center (single 10GE link from each core router)
* 2x routers used for International Gateway Connectivity (single 10GE link from each core router)
* 1x router to the national Internet Peering Center (single 10GE link from each core router)
  + 1. The eastern core routers terminates:
* 1x 10GE rings consisting of 3 PE routers (3x large PoPs)
* 2x 10GE rings consisting of 2 PE routers (4x large PoPs)
* 3x single dual-connected PE routers (3x large PoPs)
* 1x GE ring consisting of 2 PE routers (2x small PoPs)
* Data Center
  1. At the moment each large PoP router is equipped with 40xGE optical; 20xGE RJ45, 4x10GE and multiple E1. 10GE interfaces are used mainly for GPON equipments (connected via 10GE interfaces) and BRAS equipment (a single BRAS device per PoP with 10GE uplink). GE links are used for major business customers (GEs and E1s) and remote pre-aggregation switches (mainly optical GEs) used primarily for ADSL aggregation from the region (multiple GE interfaces and LAG bundles). Each small PoP router is equipped with 40xGE optical; 20xGE RJ45 and multiple E1.

1. **DWDM transport network (optional)**
   1. The extension or modernization of DWDM network is optional and the solution provider can propose his vision how to integrate IP/MPLS and DWDM networks into one converged transport network with common management.
   2. DWDM shall provide required additional services to a common converged platform that will reduce the overall complexity and capital and operational costs of running the services and will result in a cheaper transport cost of each bit of information per kilometer.
   3. The solution should provide various common IP/DWDM connection protection mechanisms.
   4. The Solution provider shall offer DWDM solution that will support 2.5Gb, 10Gb, 40Gb and 100Gb channels
2. **Mobile Network**
   1. Current mobile network is implemented on 2 sites for radio network controllers and 2 geo-redundant sites for core network platforms. These sites correspond with IP/MPLS Core sites.
   2. Current RAN technology is mostly 2G and partly 3G in selected cities. Number of physical sites for Base Stations is 1800, all equipped with 2G BS, 600 of them are 3G as well.
3. **Modernization requirements**
   1. To offer replacement of existing Core and aggregation routers based on following requirements
   2. To offer new international GWs and RR routers
   3. To offer pre-aggregation/MBH network for converged fix and mobile services (optional)
   4. New architecture and topology should provide

* Higher availability and flexibility
* Reduce network complexity
* Higher redundancy of connections
  1. The solution should be MPLS based, avoiding the scalability limitation of pure L2 networks.
  2. The number of ADSL subscribers exceeds 200.000, FTTx exceeds 20.000 and IPTV exceeds 100.000
  3. The number of mobile subscribers already exceeds 600.000 with up to 50% PDP contexts of concurrent active subscribers.
  4. Pre-aggregation dimensioning

|  |  |  |  |
| --- | --- | --- | --- |
| **Pre aggregation / MBH** |  | **Small router** | **Large router** |
| Basic HW Requirements | Min Aggregated throughput scaling per chassis | 40G | 80G |
| Port requrements | 16 x 1GE SFP (Optical) + 8 x GE/FE RJ-45 (SyncE)   8 x E1 optionally | 2 x 10GE XFP + 24 x 1GE SFP (Optical) + 8 x GE/FE RJ-45 (SyncE) + 4 x STM1 (optical) +  8 x E1 |
| Redundant processor | no | yes |
| Redundant Power Supply | YES | YES |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Small router** | | | **Large router** | | |
| Year | **2016** | **2017** | **2018** | **2016** | **2017** | **2018** |
| Qty | 150 | 100 | 70 | 40 | 30 | 20 |

* 1. IP/MPLS routers dimensioning

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IP/MPLS** |  | **Small POP** | **Large POP** | **Core** |
| Basic HW Requirements | Min Aggregated throughput scaling per chassis | chassis aggregated throughput 1Tbps | chassis aggregated throughput 8Tbps | chassis aggregated throughput 16Tbps |
| Min Forwarding capacity per slot (full duplex) | 100Gbps | 200Gbps | 400Gbps |
| Redundant processor | YES | YES | YES |
| Redundant switching fabric | YES | YES | YES |
| Redundant Power Supply | YES | YES | YES |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Small POP** | | | **Large POP** | | | **Core** | | |
| Year | **2016** | **2017** | **2018** | **2016** | **2017** | **2018** | **2016** | **2017** | **2018** |
| Chassis Qty | 5 |  |  | 20 |  |  | 4 |  |  |
| 100GE |  |  |  |  |  |  | 8 |  |  |
| 10GE | 10 | 6 |  | 14 | 10 |  | 16 | 10 |  |
| GE | 40 (opt) + 20 (electr) |  |  | 40 (opt) + 20 (electr) | 40 (opt) |  | 40 (opt) |  |  |
| STM1/E1 |  |  |  |  |  |  |  |  |  |

* 1. IGW and national peering routers dimensioning
* The solution provider should offer new scalable and fully redundant 100GE platform
* 2x IGWs and 1x peering routers should be offered
* Upstream connections will be realized via several 10GE links
* Backbone connections will be realized via 100GE links
  1. Route Reflector solution should be offered as well