Syrian Arab Republic

Syrian Telecommunications

Establishment

الجمهورية العربية السورية

المؤسسة العامة للمواصلات

السلكية واللاسلكية

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Technical Specifications for

the National Internet Backbone

and STE ISP

القسم الثاني : المواصفة الفنية

PART TWO : TECHNICAL SPECIFICATION

Technical Specifications for the Internet Backbone in Syria

1- Introduction

STE is planning to launch nationwide Internet service. providing the necessary national backbone for the Syrian Internet.

This RFP is composed of two parts:

1-1- *The national backbone*

The national backbone including:
- International Internet Gateway providing the connection to the public Internet with the required servers. filtering. caching, etc.
- Network management and network operation center. NOC.
- Dialup and leased lines access nodes. remote access servers. RAS. located in STE points of presence. POPs.
- Two main ATM switches to provide the interconnection and required links between the network parts and the ISPs.
- Electronic surveillance and monitoring system. which shall provide the law enforcement authority with the possibility to practice contents monitoring of the exchanged information and for all types of services according to the established legislation.

1-2- *STE ISP*

STE Internet service platform to enable STE to become one of the licensed ISPs focusing mainly on public sector companies educational institutions and several private companies. in addition to any ordinary dial-up users.

2- Scope of this project

The project aims at designing. supplying. installing. commissioning. integrating. and putting into service the requested systems as per item /1-/. on turnkey basis. including all required equipment. tools (hardware and/or software). spare parts. service and training.

2-1- *The national backbone*

The planned national backbone is foreseen to meet the demands for Internet services in Syria and to fulfill the requirements for current and future customers applications. taking into consideration the fast development of the Internet services technologies and witnessed growth in number of users around the globe.
STE estimates that the initial number of ISPs to be served by the national backbone network to be about 50 ISPs, and the number of RASs about 35. The national backbone should meet the following services and applications as a minimum:

2-1-1- To acquire and maintain the main addressing and domain name server. DNS. and assume its role as a top level domain (TLD) manager for the .SY domain. allowing each ISP to have his own sub-domain names and addressing.

2-1-2- To provide all private and public ISPs with the connection to the public Internet. insuring high level of availability and expandability to meet the expected growth.

2-1-3- To interconnect the ISPs networks. insuring that no traffic destined to a local ISP are transferred through the public Internet. thus making effective use of the available bandwidth.

2-1-4- To provide all ISPs with transparent and fair sharing and allocation of the RAS's ports on the basis of the declared number of customers. The solution should allow the

possibility for STE to act as a regulator to force the implementation of the declared subscription ratio as fixed in the license agreement.

2-1-5- To provide transparent support for all currently possible services including value added services that the ISPs may wish to provide, providing support for differentiated service level agreement, SLA, in order to allow ISPs competition based on services offered and quality of service, QoS.

2-1-6- To insure high degree of flexibility to adopt and cater for currently available Internet services and forthcoming future services with minimum changes. The bidder should demonstrate the abilities of the proposed solution to support future implementations based on current IP, the forthcoming IP V.6 and next generation Internet applications and services including value added services, VAS. The proposed system should be able to support future services that are either under development or planned to be developed in the standardization bodies and related forums, including the following sets of services which are identified to be of main importance in future communications networks:

- VOIP (Voice over IP)
- IP switching, Routing and VPNs.
- Video on demand.
- Other applications (tele-medicine, tele-education, instant video conferencing and other video services).

The bidder should describe in details the capabilities and features of the proposed systems and solution to best support the above mentioned services with differentiate QoS and network performance.

2-1-7- To provide all necessary security services on the national level to protect the security of the internet backbone (against hackers, attacks, viruses, etc.). To enforce the national regulations and laws regarding the Internet services and content exchange.

2-1-8- To have minimum or no effect on the private ISPs choice for equipment services and tools to be implemented in their own solutions. In other words to provide fully standardized interfacing on the service network and management levels to insure such freedom and diversity of the possible suppliers and solutions without compromising the compatibility of the network implementation or any of the different applications.

2-1-9- To provide all necessary network management services and application to insure the proper network operation administration and maintenance, OAM and proper service provisioning and management to meet customer demands and expectations.

2-2- *The STE ISP*

STE is going to be one of the ISPs that are licensed to provide Internet services directly to customers; the required platform should provide the following services as a minimum:
- Addressing and domain name services based on the main domain name as set at the national backbone, also supporting DNS hosting.
- E-mail services, to support mailing services and the exchange of the estimated amount of data with adequate quality and network performance.
- Web services, including web browsing and hosting.
- Usenet (news groups) and chat services.
- Security services, to insure the protection of customers' data and the implementation of the regulations and laws related to Internet services and exchanged contents.
- Authentication services.
- Billing services.
- Management services to insure proper OAM and service provisioning including the provisioning of managed services to customers.
- Support for provisioning of future services with minimum changes including but not limited to voice over IP, IP switching Routing and VPNs, video on demand, other

applications (tele-medicine, tele-education, instant video conferencing and other video services).

The bidder is required to demonstrate his own ability and the ability of the proposed solution in implementing these applications for a variety of different customers with different requirements and infrastructure to the best possible way, allowing differentiated SLA and guaranteed QoS.

STE already has several existing systems and equipment, as per item /4-/. The bidder should consider the best possible way to use and integrate these existing systems.

3- General requirements

The bidder will provide along with the network design a detailed analysis of the network performance, security and reliability. The network is to be designed as a public network, and therefore it should have outstanding performance, security and reliability. The bidder will provide analysis for data flow through the network. In particular, he/she should provide estimates for the average response time and data throughput for end to end user service working between two different ISPs, and between one user and the external interface of the core router (i.e. the public Internet network). All current or potential bottlenecks and security breaches should be described and analyzed thoroughly, along with necessary enhancements and upgrades required to meet the expansion of the network to accommodate a bigger number of users and ISPs. The bidder should demonstrate an outstanding design skill and experience in his analysis. The technical evaluation of the offer will be mainly based on this analysis.

3-1- *Syrian Network*

3-1-1- The transmission and switching systems and equipment installed in the Syrian PSTN network are based on ITU-T recommendations. And in case of having several alternatives within the ITU-T frame, then the European alternative is chosen based on ETSI specifications and standards.

3-1-2- STE has already contracted for a fiber based STM-16 SDH national transmission backbone, with microwave backup, to be inaugurated later on this year. Local STM-16 backbones are also due to be installed in Damascus and Aleppo connecting all points of presence, POPs, using fiber optic cables, and the same applies for most of major POPs in other areas to be connected using STM-4 rings. A Small number of POPs are connected using PDH system over fiber optic cables, few rural POPs are connected using microwave links (analog /digital) or copper based transmission systems.

3-1-3- The bidder should fully adhere to the use of ITU-T (ETSI) transmission PDH/SDH hierarchy based on E1 PCM system (G.703/G.704 recommendation). Wherever in this RFP a standard or recommendation is used as a requirement to meet, it should be clear to all bidders that only the parts applicable based on this hierarchy should be considered.

3-2- *Network and equipment*

3-2-1- The bidder should state the country of origin for all parts and components (HW and/or SW) of the proposed solutions, systems, equipment, and tools. He should also attach to the offer an officially legalized certificate of origin.

3-2-2- All proposed network equipment should be of carrier class equipment. i.e. designed to meet public carrier network performance and quality requirements for network Operation Administration & Maintenance, flexible network configuration, high manageability end-to-end, support of multi services, high availability, high reliability and continuous operation with minimum failures and service interruption.

3-2-3- The bidder should offer the latest available versions of HW and SW at contracting time. All proposed systems and equipment should be of proven design that is in current use. production. and is already released and in service in other sites.

3-2-4- The bidder should not include in the proposal products that are planned to be discontinued or abandoned in the foreseeable future.

3-2-5- The bidder must at own expense replace or upgrade any software and/or hardware equipment that becomes obsolete within 12 months after installation at STE sites. Any phased-out equipment and/or any equipment that lacks forward compatibility with newer versions is judged as obsolete. All proposed equipment should guarantee forward compatibility with new implementations of existing standards. standards currently in the process of being released. and newer standards.

3-2-6- The bidder should provide all licenses for any part of the solution hardware and/or software. All licenses should be in the name of STE as end user. No primary acceptance certificate will be issued before the delivery of the required licenses.

3-2-7- All network devices to be installed must be SNMP manageable; preference will go for devices that implement the SNMPv3 version. The bidder should deliver full specification and description for all vendor-specific enterprise MIBs for these devices.

3-3- *Standards and Compliance*

3-3-1- The proposed network should fully meet and comply with the technical requirements. terms. conditions. and standards included in this RFP as minimum criteria. Furthermore. the bidder should state any other additional applications. requirements. and standards deemed necessary or of value added for a national Internet network and that his proposed systems/equipment fully meet and comply with.

3-3-2- For any technical requirements that are not covered in this RFP and that are necessary for the proper implementation/operation for any of the items. applications. or requirements requested in the RFP, the bidder should adhere to the latest available standards related to those technical requirements.

3-3-3- The bidder should state the compliance of the proposed solutions. including all systems and equipment. with the latest standards (i.e. request for comments RFC standards, specifications and recommendations) wherever requested in this RFP including but not limited to any of the specifications of the interfaces. services. or features of the proposed systems.

3-3-4- In addition to compliance with existing standards. the bidder should also provide detailed compliance statements (or the detailed plans to comply) with any draft RFCs or standards that are ready to be released or published. or that are in the final development phase at the concerned standard bodies.

3-3-5- Preference will be given to IETF RFCs. In case that:
- There are no RFCs from IETF that fully specify the requested technical requirements.
- IETF RFCs do not cover the related subject.
- Or the RFC is not yet developed enough.

Then preference is given to IEEE, ISO/IEC, ATM Forum, network management forum NMF, ITU-T, ETSI, or ANSI standards, respectively. In such a case the bidder should submit full explanation for adopting the different standards (other than IETF RFCs) clarifying all pros and cons.

3-3-6- The bidder should state clearly without any ambiguity and wherever applicable if. because of the insufficiency and/or lack of available standards. or for any other reason. he has adopted:

- A proprietary, industry. country specific. or area specific standards other than listed in /3-3-5-/.
- Or an extended version or a variation of an existing standard.

3-3-6-1- In such a case the bidder should explain the result of adopting such a standard in terms of:
- Interoperability and Interconnection to other vendors equipment.
- Availability of compatible equipment in common markets (off the shelf products).
- The need for any authorization or licensing.
- The forward compatibility with any forthcoming standards. detailing required changes and changes to software and hardware.
- Scalability of the proposed implementation.
- Possible suppliers of any related equipment including customer premises equipment.
- All limitations and shortcomings which have not been covered in the above mentioned points.

The statement is required to be obvious and well indicated in the bidder's response to the related item. condition or requirement wherever applicable in this RFP. Failure to do so will hold the bidder eligible for any future consequences. including but not limited to: replacement of related equipment on his own cost. and cost of integration with standard based systems purchased by STE in the future.

3-3-7- The bidder should clearly reference all criteria. figures. models and simulation results that are used in his response to this RFP to a well-established standard. e.g. Interserv. In case the reference is not an IETF ATMF or ITU-T standards. the bidder is requested to include a copy of the used reference. especially models for throughput. traffic. network performance. Quality of Service. and reliability and availability.

3-4- *Vendors qualifications*

3-4-1- The bidder should provide the company profiled documents along with the bid. The bidder should also list reference sites where the same brand and solution have been installed in a major ISP carrier or a Telecommunications operator environment (contact name, telephone. and fax numbers & e-mail address to be supplied for complying sites only). This information should be provided vendors. suppliers and manufacturers if the products supplied by a company different than the bidding company. The bidding company should obtain all necessary warranties from any supplying or manufacturing company to fulfill the requirement and conditions of this RFP, in accordance with the established regulations and laws.

3-4-2- The supplier/manufacturer should be able to:
3-4-2-1- Supply records that demonstrate the current ability of the proposed solution to fully meet the immediate requirements of STE as well as the short term and long term requirements.
3-4-2-2- Provide latest company report including financial report.
3-4-2-3- Demonstrate an ongoing commitment to further develop proposed products (HW and/or SW) and its ongoing support. Please supply current development plans and schedules. e.g. R&D plans. Also please provide the related equipment R&D budget. personnel. and percent to revenues for the last 3 years.
3-4-2-4- Provide full education. training and implementation assistance. Provide details of training capabilities.
3-4-2-5- Provide full after sales support. explaining implemented after sales policy and services.
3-4-2-6- Provide professional qualified local support office.

3-4-3- The supplier must have at least one reference site where the same equipment brands name and a similar solution is installed and running in a carrier environment (Telecom. Operator or a large service provider). Please provide contact name. Tel #. Fax #. and e-mail address as well as type of equipment. and in what part of the network the equipment is deployed.

3-4-4- The supplier should give an estimated market share for his proposed products in both Internet Service Provider (ISP) & Carrier environments.

3-4-5- The supplier should state their ISO 9001 compliance. providing evidence.

3-4-6- The supplier should describe in full details his ability to provide "End-to-End" solutions including all systems equipment tools and management system that is capable of managing all components with guaranteed interoperability.

3-4-7- The supplier should describe his membership in the IETF. IEEE. ITU-T, NMF, ATM Forum. and any other standards bodies. describing his contributions to standards. Interoperation between the supplier's proposed products and other suppliers products and to what standards / specifications were the test completed for interoperability, describe in details.

3-4-8- The supplier should provide any available benchmarks. lab reviews, or test results for the proposed equipment and/or systems conducted by reputed or officially accredited institutions.

3-4-9- The supplier should provide the details about the proposed product profile, including but not limited to: launch date, current developments and planned updates, eventual phasing out, and parallel offerings with comparable capacities from the same supplier.

3-5- *Response to the RFP*

3-5-1- Any item marked optional and wherever option and optional are used. it is meant that the specific item or requirement in this RFP is optional for STE to have or not, based on the added value and cost. However, this item is obligatory for the bidder to fully meet, respond to, and include in his technical offer and he is to quote for it separately in the financial offer. Failure to do so will lead to disqualify the offer.

3-5-2- Wherever in this RFP a figure or a number is stated as a requirement it should be well-understood that it is meant as the minimum/maximum limit (according to the context) acceptable by STE. The bidder is always requested to state his system maximum /minimum limits based on the proposed system capabilities. The bidder is required to detail any upgradability and scalability requirements that can be reached as the ultimate limits of the proposed systems, specifying the effect on existing systems, other upgrade requirements. and any possible changes or modifications deemed necessary.

3-5-3- The bidder must provide along with the offer clear copies of the requested certificates, approvals and compliance statements in accordance with this RFP. Failure to do so will lead to disqualify the offer.

3-5-4- Wherever a RFC standard or recommendation is mentioned or referred to. directly or indirectly, the bidder should explain in details the compliance of the proposed solution with it. This applies to all items of the RFP whether it is clearly asked for or not.

3-5-5- The bidder should provide a full and detailed response to this RFP. item by item. in his technical offer, which should include:
   1- Detailed description of the offer.
   2- Compliance statement item by item with all terms. conditions. and requirements of this RFP.
   3- As part of the compliance statement. the bidder should provide protocol implementation conformance statement. PICS. and implementation

conformance statement, ICS, as required in the RFC recommendations and standards. If a RFC and/or a standard is issued together with a PICS or an ICS, either as general guidelines or specific, the bidder should provide the related PICS and ICS as indicated in the related recommendation or the standard. In case no ICS or PICS issued in relation to the standard or the recommendation the bidder should provide a compliance statement item by item with it based on its text.

4- Complete bill of quantities for each type of systems and for each site (e.g. RAS location).

5- Technical description and specifications of proposed systems and other extensive documentation to support the statements of compliance.

3-5-6- The respondent is requested to answer in details to ALL items of this RFP. The reply should be clear with no possibility for misinterpretations. It should be made using only Compliant, Partially Compliant, Not Compliant, Noted, or Information statement, with detailed explanation as per item /3-3/.

3-5-6-1- Compliant: A compliant statement denotes that the proposed system or equipment fully meet and comply with the requirements, terms, standards, and/or conditions implied by the item subject of the statement.
A compliance statement must be accompanied with detailed explanation. Any relevant additional information may also be detailed.
A Compliant statement will not be accepted without detailed explanation. Please note that if the requested item is not fully implemented at the time of submission, stating a future date does NOT imply compliance.

3-5-6-2- Partially Compliant: A partial compliance statement denotes that the proposed system or equipment meet and comply with some parts of the requirements, terms, standards, or conditions implied by the item subject of the statement. The response must be accompanied with detailed explanation, and should indicate the level of compliance specifying the parts of the item the proposed system or equipment is compliant with and the parts it is not compliant with.
Where necessary, any planned dates should be stated for when the requirements, terms, standards, or conditions of the item subject of the statement would be fully met and complied with. A partial compliance statement will not be accepted without detailed explanation.

3-5-6-3- Not Compliant: A not compliant statement denotes that the proposed system or equipment does not comply with the requirements, terms, standards, or conditions of the item subject of the statement. Any planned dates should be stated for when the requirements, terms, standards, or conditions will be met and complied with, in such a case a detailed explanation is required stating the level of compliance.
However if the bidder can offer a compatible alternative in accordance with item /3-3/, then detailed explanation must be given. In such a case STE has no obligation to accept this option.

3-5-6-4- Noted: A noted statement is used where compliant, partially compliant, or not-compliant statement does not apply. A noted statement indicates that the bidder has fully understood the item subject of the statement, and he is replying to all other items of this RFP taking into his consideration the information and the meaning of this particular item and its resulting requirements, terms, conditions, and/or standards.
A noted statement will be accepted without detailed explanation, though it is preferred, and it should not be used where a compliant, partially compliant or not-compliant statement is only valid as an answer. A noted statement can be used together with compliant, partially compliant, or not-compliant statements where it is necessary to fully answer all parts of a certain item of this RFP.

3-5-6-5- Information: An Information statement should be made either in reply to the item subject of the statement or to provide an explanation that is bidder specific. An Information statement will be accepted without detailed explanation, and should not be used where a compliant, partially compliant, not-compliant, or noted statement is only valid as an answer. An Information statement can be used together with compliant, partially compliant, not-compliant, or noted statements where it is necessary to fully answer all parts of a certain item of this RFP.

3-5-7- Any responses, which are not clearly marked as stated above, will be treated for evaluation as <u>Not Compliant</u>.

3-5-8- Additionally a table must be supplied, summarizing the bidder's response together with the compliance statement: reference should be made to any accompanying explanations. Also additional comments may be added such as available dates. All requested explanations should be extensive including PICS and ICS where applicable. The bidder may refer in his response (or in the table or in the compliance statement) to a specific item/page in other parts of his offer, e.g. technical document or specifications, which he believes best support his response. The following table provides an example of a table format:

Section Number	Item number	Compliance	Date Available	Reference or Additional Comments
x.1	5-3	Compliant	Now	Refer to: part, paragraph, and page
x.2	6-2-2	Partially Compliant	Feature x available as of dd/mm/yyyy	All other features are compliant
x.4	9-3	Noted and Compliant	Now	Refer to: part, paragraph, and page

4- Description of Existing Systems

The bidder should do his best to benefit from and use systems and equipment (HW and/or SW) that are already in use in STE. The bidder is to propose any required modifications, additions, or changes to the existing equipment, doing his best to keep it to a minimum. The bidder should specify in his offer:

- How use can be made of these systems? Where does it fit in the new proposed network?
- Interoperability and Inter-working with these systems.
- Support of services already available on these systems. Including migration of users and data.
- Possibility to fully manage these systems from the same management platform. Including the possibility to provide end to end services starting from, ending at, or across these systems.
- The effect on accounting and billing records generation and collection, network performance, Quality of Service, and monitoring and surveillance.

4-1- *Internet and Email system*

The existing Internet and email system provides primarily a nationwide international mail and Internet services for small number of customers, current system capacity is estimated at 5000 users. Existing systems equipment Interfaces and technical specifications are as per list A annex /2/. More information is available upon request.

4-2- *Miscellaneous systems*

STE will receive several standalone products as per list B annex /2/. The bidder should specify the best possible implementation of these systems in his proposed solution.

5- Internet national backbone description

5-1- *General*

This section describes the functional requirements for the different parts of the Internet national backbone to be provided by the bidder. STE is planning to build a nation wide Internet backbone that provides all the required internetworking services for all the ISPs. In order to rationalize the initial investment as much as possible for all ISPs, which will allow lower prices for end users, and at the same time, not to compromise the PSTN voice services and avoid any resulted congestion. STE has decided to build the remote access network around the country covering initially 35 POPs. STE will also inaugurate and maintain the main link to the public Internet maintaining the national SY domain name service and enforcing the national security requirements based on the Syrian legislation and regulations. The national backbone can be divided into four parts:

1. The international gateway, which designates the link between all ISP networks (including STE ISP network) in Syria and the Internet.
2. The access services, which designate the service allowing dial-up and leased-line users to connect to the Internet and obtain an IP number after being authenticated by ISP.
3. The public data network infrastructure, which provides the interconnection between ISPs networks, the access nodes, and the international gateway.
4. The network operation center, which is responsible for managing the whole backbone, providing all necessary OAM functions and service provisioning for the users of the backbone, namely the ISPs.

5-2- *The International Gateway*

The international gateway to the public Internet, should handle the required International link and ensure the fair sharing of the available bandwidth between the ISPs. It should also provide the necessary filtering and security measures to protect the national backbone and its management system from the outside and inside attacks, and to enforce the national security rules in relation to applicable laws for content flow and child protection. It should also contain the necessary Web caching mechanism to improve the QoS for Web users. The proposed mechanism should allow an effective caching of Web data in order to reduce bandwidth requirements and improve the response time for Web users. Finally, the international gateway should also contain the DNS server for the SY domain, which will be the primary DNS server for all ISPs.

Based on the planned initial capacity, the main connection to the public Internet is estimated to be an E3 connection in the beginning. Required capacity can grow up to STM-1 connection as a result of Internet population growth. The device (typically a high-end router) to be installed should be able to route packets at wire speed.

Connections to each ISP will be a virtual connection over the main ISP ATM link to the ATM core.

Security measures implemented through data filters should implement a high standard of content filtering, which should not cause any delay or bottleneck while maintaining the possibility to check every packet. The implemented firewalling mechanism should protect the gateway and network operation center from any possible attack from the outside public Internet or the internal Syrian Internet.

5-3- *The Access services*

As already explained, it has been decided that the access service which constitutes basically from 35 remote access servers distributed all over the country should be managed by STE.

Users access to the Internet should be transparent. Users dial-up calls will be routed to the nearest POP and authenticated using user data maintained by the ISP.

5-3-1- The Access service should distribute the access load among the RASs to reduce the load on the voice network. Hence. a RAS network with a national coverage must be carefully designed. The design must take into consideration the distribution of social and business activity in the country. It must also be extremely dynamic in order to meet unexpected increase in demand in certain areas. To achieve 10/1 ratio. the initial forecast of 50000 users requires 5000 ports in total. These ports will be distributed as explained in the following table:

Area	City	Number of ports	Number of E1
Southern zone	Damascus	10x220 = 2200	10x8
	Damascus suburbs	2x150=300	2x5
	Daraa	1x100	4
	Soueidaa	1x100	4
	Quneitra	1x60	2
Northern zone	Aleppo	4x200 = 800	4x7
	Edleb	1x100	4
	Aleppo Suburbs	2x100	2x4
Central zone	Homs	3x100=300	3x4
	Hamah	1x100	4
	Suburbs	1x60	2
Coastal zone	Lattakiah	3x100=300	3x4
	Jableh	1x60	2
	Tartous	1x100	4
	Banias	1x60	2
Eastern zone	zone A	1x150	5
	zone B	1x100	4
Total		5090	187

5-3-2- The proposed solution suggests that RASs are to be managed by STE and located into STE buildings, while the ISP's equipment, including authentication servers, will be located in his own offices. Hence, a mechanism needs to be implemented to ensure that the access system will be able to route the user's dial-in call to the appropriate authentication server and open the required connection in case authentication is OK. The user will then be attributed an IP number belonging to the ISPs network.

5-3-3- The access service must exert the required modularity and flexibility to allow several scenarios to ensure transparent and fair sharing of the ports among ISPs. The number of ports allocated to an ISP is proportional to the declared number of users fixed in the license. Several port allocation schemes should be possible, including but not limited to:

-   Ports are allocated at the national level. The set of ports available countrywide is considered as one pool of ports available to all ISPs. Port allocation will be done dynamically and on demand. The number of ports allocated to the same ISP may not exceed at any moment the number of ports declared in the license.

-   Ports are allocated at a regional level, where each ISP has to determine a-priori his need of ports in each of the defined regions. Allocation of ports on the regional level is dynamic and on demand.

-   Ports are allocated per RAS. Each ISP will have to specify the number of ports needed at each RAS. The total number of ports allocated to the same ISP may not exceed at any moment the number of ports declared in the license.

5-3-4- ISPs should have the possibility to overflow of the specified number of ports based on premium charges and availability of free ports without affecting the fair sharing of available ports between other ISPs.

5-4- *The public data network*

STE has already announced an RFP for a nationwide ATM-based public data network that is planned to provide data communications services all over the country, however, the project is expected to take over a year to be in operation. STE in response to customer demands' for immediate Internet introduction is planning to have the Internet service launched in Syria before the inauguration of the PDN. Therefore, STE is planning as part of this RFP to have 2 ATM switches as a transient solution for providing required data communications and interconnections for the Internet project. The 2 switches should be able to be integrated within the future PDN based on the attached specifications annex /1/. Bidders should demonstrate the openness of the management interface, as it should also be manageable from the same management platform as requested in the PDN RFP no. 009/99.

5-4-1- The proposed switches should provide all required connections for the Internet project, insuring the proper and most efficient interconnection between the ISPs, the International gateway, and the remote access servers.

5-4-2- The proposed switches should be flexible scalable and fully configured with all necessary protocols and interfaces to support different operation scenarios for the Internet backbone. Please describe in details.

5-4-3- The bidder should provide detailed calculations and planning for the estimated traffic load to be carried by the proposed switches based on his proposal for the Internet backbone, detailing all used assumptions models and estimations. The bidder should reference all the used assumptions models and estimations to a well-established standard.

5-4-4- The bidder can use the following estimated pattern of the traffic flow as perceived by STE, however, alternative assumptions will be considered if justifiable based on the bidder experience, statistics collected from similar countries in the region, and established models:
  - 80% of total traffic (web and e-mail) is aimed at the public Internet, 15% is local traffic between the ISPs networks, and only 5% are within the ISP own network.
  - The traffic flow is asymmetrical in nature, as incoming traffic outweigh outgoing traffic by a factor of 10:1, mainly based on estimated high volume external web browsing activities, especially in the initial stage.

5-4-5- The proposed switches are to be located one in Damascus and one in Aleppo to provide necessary resilience and protection. The two switches are to be connected with 2 x STM-1 links. They should be working in load sharing during normal operation, however, each of the two switches should be capable alone of handling the estimated network load in case of a failure of the other one.

5-4-6- The bidder should propose the most possibly simple physical configuration to insure simplicity of OAM and provisioning, while making excessive use of virtual circuits and connections to insure 100% connectivity of all parts of the network and from any to any part, preferably using SVC if not SPVC. The bidder may suggest equal alternatives based on his experience subject to item /3-3/.

5-4-7- The proposed switches should be able to provide at least 2000 simultaneous VCs, preferably SVCs or SPVCs, or a combination of both based on the proposed design: please describe in details.

5-4-8- The proposed switches should meet the following capacities as minimum requirement:
  5-4-8-1- They should provide at least 35 links for the connections of the RASs from around the countries.

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- The connections is to be carried over PDH transmission systems and optical links to STE central offices, COs (POPs), the links available are mostly E1 and E3 connections.
- STE made the initial planning of the configuration of the network based on a VPN solution, where each RAS is connected using one link to the PDN. This link should be configurable to provide at least 60 virtual connections, VCs, to each of the ISPs, NOC, and monitoring system ...etc.

5-4-8-2- They should provide at least 50 links for ISPs locations using mostly twisted pair copper wires, 0.4 mm^2, to the nearest CO and fiber optic between COs.
- The longest distance from an ISP to the nearest central office do not exceed 7 km in most cases, in average 4 km.
- The bidder should suggest solutions for the connection from the nearest CO to one of the ATM switches using either, the PDH transmission systems and optical links (combined copper to CO and fiber to the ATM switch). The bidder can suggest several solutions based on different scenarios, (one ISP only is to be carried from a certain CO, few ISPs are co-located in the same CO, or from a major CO where many ISPs are expected to have a node there). Distances between the COs range widely to cover the whole country.
- STE made the initial planning of the configuration of the network based on a VPN solution, where each ISP is connected using one physical link to the PDN. This link should be configurable to carry at least 40 virtual connections, VCs, to each of the RASs, the international gateway, NOC, and monitoring system ...etc.

5-4-8-3- Two links to the international gateway (could be separated in two for outgoing and incoming traffic based on the bidder design of the backbone). The links should also accommodate not less than 100 VCs to provide the connections to the ISPs, the NOC, and monitoring center.

5-4-8-4- Two links (could be multiple based on the suggested design of the backbone) to provide required connections to the monitoring center. Number of VCs to be accommodated should be calculated based on the suggested monitoring configuration and should not be less than 100 VCs.

5-4-8-5- Two links to the NOC, to provide connections to all network nodes, devices and equipment for the purpose of achieving End-to-End management. The links should also accommodates not less than 100 VCs to provide the connections to the ISPs, the NOC, monitoring center, and possibly RASs.

5-4-9- The bidder should provide detailed calculations for each link capacity using ATM based links, and based on his suggested design of the national backbone and the calculated traffic load.

5-4-10- The bidder is to suggest the links to be implemented using either E1 NxE1 or E3 connections, as they are the currently available connections on STE PDH transmission backbone. However the bidder should take into his design the most efficient way for using the future SDH backbone to be inaugurated in 12 months time, please describe in details.

5-4-11- If several E1s or E3 were used to provide a link to a certain node, use should be made of IMA or other alternatives based on latest ATMF and ITU-T to provide one logical link over the several E1/E3 pipes. It should insure that all VCs over all E1s are treated as one pool with no distinction.

5-4-12- The bidder should list the required number of ports on each switch and the proposed type of each interface, e.g. native ATM, LANE, or CES, based on his proposed design of the national backbone. The bidder should also include in the offer the required network termination equipment at the site of the connected nodes based on the proposed interfaces.

5-4-13- The bidder should suggest the number of ports on every switch based on the proposed network topology taking into consideration, full 100% connectivity between all nodes

and devices as detailed above, protection and redundancy, and most efficient use of transmission resources.

5-4-14- The proposed switches should meet as a minimum requirement the specifications as per annex /1/. Please respond in details to all items of the annex.

5-5- *The network operation center NOC*

The network operation center is responsible for the planning and implementation of management policies at the country level. The mission of the NOC can be described as follows:

- The NOC staff will be responsible for the management of the national backbone, which includes the RAS network, the network that connects RASs to the ISPs, and the International gateway. The NOC will have to carry out all service and network management functions including operation administration and maintenance, OAM, in addition to planning and provisioning for all parts of the backbone.
- The NOC is responsible for the enforcement of policies regarding port allocations to ISPs. This includes setting and monitoring quota for ISPs (if any) on the RASs, insuring that no single ISP is allocated more than a certain ratio per RAS. Ratios may be different per each RAS.
- The NOC is responsible for the collection, filtering, and correlation of traffic flow and statistical data from the backbone devices in order to release periodic reports about the usage of Internet. This data would be then used as an indicator to modify the configuration of the national backbone in order to insure an efficient use of resources and better QoS. Configuration modifications may include the redistribution of available ports among POPs based on usage rate, port capacity upgrade to meet the demand, planning POPs relocating and addition, configuring and supervising connections between all nodes, and change of port allocation policy as described in section /5-3/.
- The NOC will cooperate tightly with ISPs help desks to check connection problems. Given that the RAS network is owned and operated by STE, ISPs are not supposed to have full control on the RASs and on their management system. Therefore, users who have problems connecting will report their problems to the ISPs help desk, which in his turn needs to coordinate with the NOC in order to diagnose the problem, isolate the faulty components, and repair or replace it. The solution to be implemented should support the coordination between NOC and ISP help desks to facilitate connection problems trouble shooting.
- The organization of the NOC would require a strict definition of authorities and rights. Multi-level access rights must be implemented and the work of authorized people should be monitored and subject for evaluation and auditing by concerned authorities at any moment. All management actions should be logged along with the identity of the manager, storage capacity should be sufficient to keep an online copy of the logs for a month at least. Logs may not be altered or modified by the NOC staff, regardless of their authority level.
- The NOC staff should insure a high availability of the national backbone equipment. Given the International nature of Internet activity, it is mandatory that the NOC continues to operate on a 24x7 basis.
- The NOC will provide ISPs with periodic reports about activity statistics, including the ratio of refused connections for exceeding allocated number of ports, which will help the ISPs planning their growth and adjusting the number of ports.

6- Technical specifications for the Internet backbone

6-1- *International gateway*

STE may receive one core router, one distribution router, and two enterprise Ethernet switches as per annex /2/ list B, the bidder should make use of it as per item /4-2/. However,

the bidder should take into consideration to include in his financial offer the cost of equivalent equipment separately as an option for STE.

6-1-1-   Core router
The connection point to the Internet must be duplicated for high availability and redundancy.
In order to achieve this condition the bidder is required to offer two multi-protocol core routers completed with all required cables and accessories. each of the routers should meet the following requirement as a minimum:

6-1-1-1-   The proposed routers should be flexible. scalable and fully manageable (on-site or remotely).

6-1-1-2-   Each router should be able to handle on its own all estimated traffic loads, routing packets at wire speed (STM-1). They should be both working in load sharing configuration during normal operation, with possibility for automatic change over to handle all traffic in case of the failure of one of them.

6-1-1-3-   The bidder should provide detailed calculations for the estimated traffic that could be carried by the router. stating all models and assumptions made or used.

6-1-1-4-   The router should have 7 expansion slots at least. Some of the slots must be available for future capacity expansion without the need to change-out the router, the bidder should describe in details:
- Max No of all router slots
- Max No of processor slots
- No of free slots witch could be used for expansion objects
- Max. No. of ports supported on the router for each type of the interfaces, stating clearly any limitations whatsoever on the possible no. of ports that can be used in different configurations/combinations.

6-1-1-5-   The router should support at least the following network interfaces or any combination of it:
- ATM E3 and STM-1
- Channelized and unchannelized E3 and E1
- Gigabit Ethernet. Fast Ethernet and 10BaseT Ethernet
- High Speed Serial Interface (HSSI)
- Synchronous Serial
- ISDN PRI
- FDDI half and full duplex

6-1-1-6-   It should have the following installed interfaces:
- 2 x ATM STM-1
- 2 x 2 Fast Ethernet 100BaseT

6-1-1-7-   The proposed router should support online card insertion and removal without the need to reboot the system or take it off-line.

6-1-1-8-   The router should have support for the following routing protocols as a minimum: RIP, RIPv2, OSPF, and BGP4.

6-1-1-9-   It should be SNMP manageable.

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6-1-1-10- It should have self-diagnostics tools to ensure good operation before going online. In addition to automatic diagnostics following the detection of errors as a result of built-in auto-test.

6-1-1-11- The bidder should explain the relationship between all components (including but not limited to processing capabilities & router memory) and the following router capabilities:
- Throughput
- Routing tables
- Latency

The router should be delivered with sufficient installed memory to fully meet current estimated payload and traffic based on the bidder suggested network design. The bidder should details all assumptions and models used in calculating founding estimations.

6-1-1-12- The bidder should guarantee that the maximum capacity of memory that could be installed into the router is sufficient for future expansions of the international link to the Internet and growth of Internet traffic. He also should provide pricing information for expansion modules in his financial offer.

6-1-1-13- It should have installed flash memory to enable remotely, fast and reliable software updates.

6-1-1-14- It should have NVRAM for system configuration information.

6-1-1-15- It should be equipped with redundant power supply for protection against system interruption.

6-1-1-16- It should support 19" Rack mounting capability.

6-1-1-17- Router software should assure reliable internetworking by supporting LAN and WAN protocols, and should be online configurable.

6-1-1-18- The router should support fast booting capability after software updates or system reboot, which should not exceed 40 s.

6-1-1-19- The bidder is also required to completely describe in details the following points:
- Router protocols
- Routing tables capacities
- Routing speed and latency
- Throughput capability
- Processing power and limitations
- Router dimensions
- Power requirements
- Required operation environment

6-1-2- Distribution router
The proposed routers should be provided in redundant configuration and each of the proposed routers should meet the following requirements as a minimum:

6-1-2-1- The proposed routers should be flexible, scalable and fully manageable (on-site or remotely).

6-1-2-2- Each router should be able to handle on its own all estimated traffic loads, routing packets at wire speed (STM-1). They should be both working in load sharing configuration during normal operation, with possibility for automatic change over to handle all traffic in case of the failure of one of them.

6-1-2-3- The bidder should provide detailed calculations for the estimated traffic that could be carried by the router, stating all models and assumptions made or used.

6-1-2-4- It should have 6 expansion slots at least. Some of the slots must be available for future capacity expansion without the need to change-out the router, the bidder should describe in details:
- Max No of all router slots
- Max No of processor slots
- No of free slots witch could be used for expansion objects
- Max. No. of ports supported on the router for each type of the interfaces, stating clearly any limitations whatsoever on the possible no. of ports that can be used in different configurations/combinations.

6-1-2-5- The router should support at least the following network interfaces or any combination of it:
- ATM single mode and multi mode
- Fast Ethernet and 10BaseT Ethernet
- High Speed Serial Interface (HSSI)
- Synchronous Serial
- ISDN PRI
- FDDI half and full duplex
- Channelized and Unchannelized E1 and E3

6-1-2-6- It should have the following installed interfaces:
- 2x ATM STM-1
- 2x2 Fast Ethernet 100BaseT

6-1-2-7- The proposed router should support online card insertion and removal without the need to reboot the system or take it off-line

6-1-2-8- The router should have support for the following routing protocols as a minimum: RIP, RIPv2, OSPF, and BGP4.

6-1-2-9- It should be SNMP manageable.

6-1-2-10- It should have self-diagnostics tools to ensure good operation before going online. In addition to automatic diagnostics following the detection of errors as a result of built-in auto-test.

6-1-2-11- The bidder should explain the relationship between all components (including but not limited to processing capabilities & router memory) and the following router capabilities:
- Throughput
- Routing tables
- Latency

The router should be delivered with sufficient installed memory to fully meet current estimated payload and traffic based on the bidder suggested network design. The bidder should details all assumptions and models used in calculating founding estimations.

6-1-2-12- The bidder should guarantee that the maximum capacity of memory that could be installed into the router is sufficient for future expansions of the international link to the Internet and growth of Internet traffic. He also should provide pricing information for expansion modules in his financial offer.

6-1-2-13- It should have installed flash memory to enable remotely. fast and reliable software updates.

6-1-2-14- It should have NVRAM for system configuration information

6-1-2-15- It should be equipped with redundant power supply for protection against system interruption

6-1-2-16- It should support 19" Rack mounting capability

6-1-2-17- Router software should assure reliable internetworking by supporting LAN and WAN protocols. and should be online re-configurable

6-1-2-18- The router should support fast booting capability after software updates or system reboot, which should not exceed 40 s.

6-1-2-19- All required cables and accessories should be delivered

6-1-2-20- The bidder is also required to completely describe in details the following points:
- Router protocols
- Routing tables capacities
- Routing speed and latency
- Throughput capability
- Processing power and limitations
- Router dimensions
- Power requirements
- Required operation environment

6-1-3- Core Ethernet switch specification
The bidder should propose two Ethernet switches in order to connect the core routers. distribution routers, firewall. International backbone servers, and management stations. The both switches should be provided in redundant configuration.
Each proposed switch should meet the following specifications as a minimum:
- Be a fast Ethernet switch.
- Have 24 ports at least.
- Have 2 up link ports at least.
- Be SNMP manageable.

6-1-4- ATM interface specifications:
The proposed ATM interface should meet the following requirements as a minimum:

6-1-4-1- It should interfaces that implement the full stack of ATM protocol (physical. ATM, AAL) including all sub-layers according to ATM Forum and ITU-T standards.
6-1-4-2- STM-1 multi and single mode port.
6-1-4-3- Capable of supporting 2000 virtual connections (SVC SPVC or PVC) at least.
6-1-4-4- It should support transmission speed of 150K 64-bit packet per second with zero packets dropping.

6-1-4-5- It should be capable to meet the need of VPN customers.

6-1-4-6- It should support 256 VLANs at least.

6-1-4-7- It should support the equivalent of 512 simultaneous packet segmentations and re-assemblies (SARs) at least.

6-1-4-8- It should support online insertion and removal features on the router.

6-1-4-9- It should support the following ATM virtual interfaces as a minimum:
- Switched virtual connections (SVC).
- Semi permanent virtual connection (SPVC)
- Permanent virtual connection (PVC).
- Virtual channel (VC) and virtual path (VP).
- Unspecified bit rate (UBR).
- ATM Forum UNI 4.0, 3.1, 3.0.
- ATM Adaptation Layer 5 (AAL5).

6-1-4-10- It should support the following Internetworking services as a minimum:
- Cell relay services CRS.
- LANE v.2, VLAN.
- IP ATM ARP CLIP (RFCs1577 and 2225), IP over ATM (RFC 1483).
- MPOA with I-PNNI and PAR.

6-1-4-11- The proposed interface should support management services based on SNMP v2 or v3, according to the ATMF specifications M3, M4 interfaces as a minimum requirements.
- Both F4 (Virtual paths) and F5 (virtual channels) Operation, Administration and Maintenance (OAM) for performance and fault monitoring.
- ATM Forum Interim Local Management Interface (ILMI).
- SNMP agent support IETF (RFC 1213).

6-1-4-12- It should also support the following MIBs as a minimum:
- It should support SDH management MIB, in compliance with G.774 and M.3100 at least.
- Virtual Terminal Protocol (VTP).
- LAN Emulation (LANE).
- AToM (RFC 1695).

6-1-4-13- It should have alarm indicators to state the following incidents:
- Buffer overflow
- Buffer information parity check
- Loss of cells/packets
- Loss of signal

NO

6-1-5- Network security and firewalling

The bidder must put a special emphasis on security features to build a bulletproof network without security breaches. The bidder will provide a detailed design of the secured network, including the best location and protection mechanisms of servers, management workstations, routers and LAN equipment. The bidder is not to be restricted to the use of the firewall, he has the right to include in his design all complementary hardware and software devices provided he describes the extra security gained by deploying these devices.

The international gateway equipment should be protected with a firewall. The bidder should consider the installation of a firewall similar to the one described in the STE-ISP item/7-1-4/ as a minimum requirement.

6-1-6- Web caching and filtering

Regardless the implementation mechanism (web cache appliance. cluster of web caches appliances, proxy server. a farm of proxies. etc.). the proposed solution must meet the following requirements:

- Initial configuration must support 16000 simultaneous connections at least, the configuration must be upgradeable to support 64000 simultaneous connections at least. Acceptable upgrades include, but are not limited to, upgrading the proxy server or the web appliances or adding more appliances to the cluster).
- The solution must be transparent to the user and should not constitute a single point of failure or a bottleneck.
- The cache must be able to serve a minimum of 1000 objects per second.
- The initial configuration must have a caching throughput of 45 Mbps, upgradeable to 155 Mbps at least.
- The cache must have a minimal object hit ratio of 40% and a minimal byte hit ratio of 40%.
- The cache must have support for the HTTP, FTP and DNS protocols at least.
- The cache must have support for the ICP and CARP caching protocols at least. In case it relies on proprietary protocols to meet the above requirements, these protocols should be described in compliance with the section /3-3/ concerning standards.
- The cache must allow filtering of undesired sites. Filtering mechanisms should include the possibility to specify undesired sites by name. by IP address. and using wildcards (e.g. *foo* should block access to all sites which contain the word foo in their name).

6-1-7- Servers and workstations
The bidder should provide two servers for the common services of the national backbone, including all necessary SW and HW. Services to be provided are DNS-1, DNS-2 and News service.
Servers must have the following features and specification:

1. Multiprocessor machine with 64 bits RISC architecture processor
2. Initial configuration must have a performance level of SPECrate int95 190 at least. The server must be expandable to provide a performance level of SPECrate int95 350 at least.
3. Dual Ultra SCSI controllers
4. 4x9.1 GB Ultra SCSI hot-swappable internal disks. with the possibility to increase internal storage up to 100 GB with hot-swappable disks.
5. Dual hot-swappable redundant power supplies
6. Must run UNIX SYSVR4 with unlimited user license
7. Internal SCSI CD-ROM
8. 3.5" floppy drive
9. at least 3 PCI expansion slots
10. external Ultra SCSI interface
11. 20" graphic console monitor

6-1-8- Monitoring system
This section describes the requirements for the monitoring software used mainly by law enforcement authorities to monitor information exchanged over the Syrian Internet. It should not be confused with the performance monitoring capabilities of the management software that is mentioned in the next section.

The monitoring system must contain a database system to store and search data. The database must keep an online copy of monitoring data for one-month period. The

bidder should provide necessary backup and storage devices including optical and tape storage facilities for long-term archiving.

All monitoring services must connect to this database. The system must also provide an easy to use GUI. Monitoring operations must be intuitive and easy to configure without the need for a considerable knowledge in networks and computers.

All monitoring equipment must be totally separated from other equipment. Monitoring system should be able to monitor the following services:

1- Target (user) monitoring
- The system must allow full online monitoring of 10 users at least. It should also allow offline monitoring of 50 users at least. The system must be expandable to allow full online monitoring of 30 users at least and 200 users offline.
- The system must provide provision for three target monitoring terminals at least, with the possibility to expand to six terminals in two years.
- The system should record all data sent or received by the target covering all services and protocols including but not limited to: VOIP, email, web, chat and news.
- The system must be connected to a database to store and search monitored data.

2- Email service:
- Monitoring system should provide the mean to have a duplicated copy of all email exchanged over the network. That includes email exchanged between two local servers, between two users of the same server, and international mail in both directions.
- The monitoring system must provide database capacity to store and search email messages accumulated over a period of one month at least. Estimated initial capacity is not less than 150.000 messages per day with 10k bytes each. The system must be scalable up to 400.000 messages at least in two years.
- The system must provide provision for five email monitoring terminals at least, with the possibility to expand to ten terminals in two years.
- The offered system must be totally transparent to the users. the failure of the system may not have any effect on email service for the users. The bidder will provide figures for expected performance hit and bandwidth consumption. must be reduced to the minimum possible.
- The system must be able to meet traffic requirements of expected user population, estimated at 200.000 users.

3- Web pages sampling
- In addition to full logging of accessed URLs, the system must provide the possibility to monitor a random sample of the contents of accessed pages. The required sample size is at least 5% of accessed web pages.
- Sampled data must display the contents of the accessed page and the name of the user who asked for it.
- The system must provide provision for three online web-monitoring terminals at least, with the possibility to expand to five terminals in two years.

4- Chat monitoring
- The system must provide the possibility to monitor a random sample of the contents of accessed chat forums. The required sample size is at least 5% of accessed forums.
- Sampled data must display the contents of the chat forum and the true name of the connected user.

- The system must provide provision for one online chat-monitoring terminal at least, with the possibility to expand to two terminals.

5- News monitoring
- The news monitoring system must be able to retrieve a full copy of news articles stored on the news server.
- The system must have provision for one news-monitoring terminal at least.

In addition to the a.m. minimum requirements, the bidder should describe in details the possibilities to detect, intercept, and block the exchange of encrypted data, along with all other possible monitoring features and applications.

6-2- *Access service hardware and software*

6-2-1- Remote Access Servers (RASs)

Remote Access Servers must meet the following requirements as a minimum:
- Accept at least 700 simultaneous connections for servers which will start initially at 150 ports (total 17), 500 for servers which will start at 100 ports (total 14), 200 for servers which will start at 60 ports (total 4). Dial-up connection ports should be provided as channalised E1 modules.
- The bidder should explain the necessary configuration to obtain the required number of ports, e.g. cascading several chassis, clustering via a network, one single big chassis, etc, stating clearly any limitations that could result from the proposed configuration. He should state clearly the expandability of the configuration along with the estimated cost of expansion per port.
- The RAS software should be upgrade-able via flash RAM, remotely downloadable.
- It should have Ethernet and Fast Ethernet interfaces installed.
- The following WAN interfaces must be supported: channelized and unchannelized E1, ATM, xDSL (ADSL, HDSL, SDSL) and ISDN PRI. Five per cent of the installed ports would be reserved for leased line connections. Please provide technical and pricing information (in the financial offer) for all a.m. modules.
- Support for IP routing, supported protocols at least RIP, RIPv2 and OSPF.
- Security features required: Support for the Radius Authentication server, support for PAP and CHAP at least.
- Redundant powers supply, for increased reliability.
- The RAS must be scalable; increasing the number of connected ports should not provoke a noticeable drop in performance. Main performance criteria are the average user throughput measured in bps and the ratio of completed calls.
- The RAS should support all signaling systems used by STE telephone switches (mainly EWSD and AXE10, in addition to a few NEAX61K and E10). The bidder should configure the RASs to support the adequate signaling system based on the type of telephone switch it will connect to. The required signaling systems are:
  - CCS No.7 ITU-T White Book/Annex 3/
  - CAS MFC R2 /Annex 4/
  - ISDN PRI DSSI /to be provided upon request/
- The RAS should support the introduction of VOIP. Please describe in details all supported devices (e.g. voice gateway), protocols and necessary modifications.
- The bidder should mention in details all information related to height, weight, power requirements, and operating requirements (temperature, altitude, and relative humidity).

6-2-2- In addition to the previous technical requirements. the RAS management system must allow the administrator to perform the following tasks:
- The manager has to be able to establish a remote connection to the RAS, reboot the unit and verify that it is resumes service correctly. The manager should not be disconnected during the reboot.

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- The possibility to remotely add and delete user accounts on the RAS must be available.
- In case a user is suspected, the manager should be able to pinpoint the user, force a disconnect, and disable the suspected account.
- The management system must provide functions for remote diagnostic of faulty modules (modems, E1 cards, etc.). Once a faulty module is found, the management system must allow the manager to disable them to avoid future incorrect behavior.
- The bidder should explain in details the RAS and its management system operations to provide different scenarios for ports allocations as per item /5-3-2/ and /5-3-3/.
- The bidder should explain the mechanism implemented as per item /5-3-2/, detailing any possible scenarios and configurations, including the allowance of overflow of an ISP at premium rate.
- The management system must provide support for sharing responsibility among several managers. Share of responsibility must be fully secure with defined roles and multi-level management; it should allow remote management for whole or part of a RAS or several RASs without introducing security breaches.

6-2-3- Offers which aim at the integration of the RAS device into already existing telephone switches will be accepted provided that they are compliant with the previous specifications. In such case, the bidder should provide in details the pros and cons of such a solution, including all supplementary or extra services that promote possibility of integration between voice and data. All additional supplementary and extra services that may result should be offered as an option and quoted for separately in the financial offer.

6-3- *Network Operation center*

6-3-1- Network Management System Architecture

6-3-1-1- The bidder should provide an NMS system. The proposed system should be able to handle the management traffic and functions for the entire network at the peak hour.

6-3-1-2- The system should be able to handle and view the whole network, so to have required connections to receive the information related to all network elements. The NMS should have the information stored and collected in a duplicated copy fully synchronized and unified, in order to take over in a very short time.

6-3-1-3- The proposed system should be configured to handle the full network configuration at peak hour, please provide the detailed calculations of the estimated load and any assumptions made concerning the management overhead. E.g. transactions per seconds, b/s, required storage to meet one-month log file period, and required processing power in MIPS. The bidder should prove the capability of the proposed system to meet the calculated load.

6-3-1-4- The bidder should explain in details the scalability of the proposed NMS, specifying the maximum supported number of nodes and operators without needing any HW additions.

6-3-1-5- The bidder should specify the maximum configuration of the proposed NMS and if it can grow to support the network with its estimated growth. Describe the management system architecture, including, but not limited to the following:
- Maximum number of Network Management stations.
- Maximum number of devices that can be managed from one station.

- Number of management consoles per server, if any.
- Number of MIBs shipped with base product.
- Number of third party MIBs included or supported.
- Support of on-line configuration changes.
- It should be possible to remotely re-boot a node via the NMS application
- The NMS support for network partitioning. Partitions should be created for departments, geographical regions, ...etc. describe in details.
- Please describe the capabilities available to allow the O&M cost of the network to be automatically allocated based on usage and quality of service attributes and on the NMS database.

6-3-1-6- Based on the a.m. calculations the bidder should provide detailed configuration for the IN-band or out-band management information channels. Taking into consideration the requirement for redundancy and protection of the management information paths or channels.

6-3-1-7- The network equipment should hold its own registry of services and connections to facilitate local autonomous operation.

6-3-1-8- To facilitate low risk system software or configuration data changes, the network equipment should hold its most recent, stable version of software and configuration data in a local, non-volatile storage concurrent with the new software and/or configuration data. In order to allow rapid fallback in the event of failure of newly loaded software.

6-3-1-9- The proposed NMS should provide the following capabilities:
- To support MIB Browsing & editing facility, Network Analysis, Thresholding, Remote configuration, Trouble Ticketing, describe in details.
- To support traffic management, network usage & trend capabilities (routing of virtual circuits, rerouting, and congestion management...) for all different types of traffic, network, services & quality of service layer management views & control, please explain in details.
- For ease of control and service provisioning all technologies and systems proposed within this project should be controlled from a single graphical management system.
- The NMS should rely on the latest version of RMON wherever applicable, please describe in details.

6-3-1-10- The bidder should estimate the required number of workstations to handle the peak hour management operations. Please explain providing detailed calculations with 1:N redundancy configuration. The bidder should provide in details the specifications of the proposed WS, including but not limited to:

- One 300MHz 64 bits RISC processor
- 256 KB external cache
- 256 MB of RAM at least, expandable.
- 3 x PCI slots
- 1x10/100 Mbps auto-sensing Ethernet Network Interface
- Fast-Ultra Wide SCSI controller, with external connector
- 2x 4 GB hard drives
- One serial port at least
- One internal CD-ROM and one 3.5" floppy drive
- 8 bits Graphic controller
- 21" Color monitor
- UNIX SYSVR4 operating system

6-3-1-11- The failure of NMS must not affect the network or any node operation.
The NMS support for fail-safe operations can be divided into four key areas:
- features built into the individual network elements to help protect against failures at their source or to promote "self-healing" (operability and reparability) within the network;
- features built into network protocols to support fail-safe and continuos operations including traffic management. automatic recovery and re-routing, directories. security, etc.;
- tools that automate the diagnosis of service outages and facilitate the avoidance of problem areas (maintainability and restorability); and
- applications that reduce the operational involvement of human operators by off-loading routine tasks, automating detection procedures, and generally assisting with the involvement of human in network operations (usability).

6-3-2- Management services
The proposed NMS should provide and comply with the management services and functions listed in the IETF and ATMF specifications and ITU-T recommendations including but not limited to M.3200, and M.3400, and the related items of Q.811, Q.812, and Q.82x.x. The NMS should also provide the specified capabilities in M.3300 for the operator WS. as a minimum requirement.
The proposed NMS should provide the following functions and services as a minimum requirement, please explain in details as per the following items:

6-3-2-1- Fault management
Element fault management supports functions, which enable the detection, isolation and identification of abnormal operation of element equipment (HW and/or SW), software, and other associated network's facilities. An event is considered to be any occurrence which results in an alarm or which indicates potential problems.

6-3-2-2- Accounting Management
The ability to collect and manage statistics generated in the routers and switches, and organizing data into the formats used by billing system. It shall also provide the possibility for another management system, e.g. business management, to be capable of polling or collecting billing statistics as required. The service management system polling and collecting process must be manageable by the network manager, providing automatic and manual control functions. At minimum the data collection frequency, and storage duration must be configurable by element or system type and unique and identifiable names must be able to be assigned to statistics files. records and data to support STE and local requirements. In addition, element or system polling status must be identifiable and procedures provided to sequence and synchronize the collected data, as well as, audit processes to insure data integrity.

6-3-2-3- Configuration management
The NMS should be capable of providing graphical topological and hierarchical view of the network and its elements, from the highest logical level down to the smallest physically or logically configurable network element. (e.g. signaling network, timeslot. or channel. logical VCC, and the levels in-between).
Individual logical and physical elements representing the network resources should be graphically represented with uniquely identifiable icons capable of flexible, customizable. user defined naming conventions based upon local service requirements. The status (in or out of service) of all elements should be easily and visually determinable by the state (e.g. color or shape) of its icon.

6-3-2-4- Performance and Traffic management

The performance management should include the following minimum functions:
- Real-time performance monitoring
- Specify real-time performance criteria
- Request on demand performance information
- Performance data logging, and extensive traffic measurements and statistics
- Modify performance data logging criteria
- Retrieve performance log, traffic analysis measurement and statistics.
- To provide effecting correction actions based on the traffic and performance information and criteria, including but not limited to rerouting, addition of extra capacity, etc. The actions can be direct or by using configuration management.

6-3-2-5- Security management
The network management station should provide a number of security features to insure the integrity of the system and the network it manages.
Multiple levels of access password functions per user and application is required. User and application access should have extensive & renewable security features and be highly available. Extensive firewalling of system resources is essential to prevent unauthorized access. Secure command and control communications channels between network elements systems and users are fundamental to reliable system operation. It should be possible to delegate access and functional authority as required by local policy. System security audit functions are required to insure that security policy is enforced. The bidder should describe the overall security management facilities provided by the proposed NMS.

6-3-2-6- Network planning and design (modeling and simulation) [optional]
The network management system should be able to act as a planning and design tool, in order to:
- Read, design, modify, and analyze the network on line.
- Plan future expansion and impact on service usage and resource allocation.
- To optimize and redesign the topology considering performance QoS and cost effectiveness through the reallocation of resources based on traffic measurements and existing configurations.
- Document all network information and keep track of dynamic and static network information to provide long-term analysis and planning.

6-3-2-7- Service management
6-3-2-7-1- General requirements
It should be possible to share network management tasks and services between multiple administrators for enhancing the network efficiency for STE.
6-3-2-7-2- Views
The bidder should offer customized view's. Given the size of the network this feature should allow system administrators to respond to network events quickly by having network views that correspond directly with their job and ensure the security of sensitive network elements by restricting visibility.
6-3-2-7-3- Virtual private networks (VPN)
The bidder should offer customers, internal or external to STE, the ability to carry out all the functions identified in the network management section of this RFP. Two levels of VPN should be offered:
The first should allocate both bandwidth and path end resources to the VPN giving the VPN systems' administrators full control.
The second function should allocate path end resources only.

6-3-2-7-4- VPN security

As end users will have access to network elements in STE high levels of network security should be maintained. The ability to limit commands and assign passwords is crucial. The bidder should provide details of VPN security.

7- STE ISP

This section describes the specifications and requirement for the STE ISP, as it is intended to have STE providing Internet services to end users through an independent platform. Although this section is considered as a independent part, all general conditions that are included in this RFP especially parts of items /1/, /2/, /3/, /4/, /8/, /9/, /10/, /11/ and /12/, should be applied.

7-1- *Description of STE ISP*

7-1-1- Introduction

Syrian Telecommunication Establishment "STE" is to assume the role of ISP mainly for the governmental organizations. establishments. ministries, and other customers. The proposed solution must meet the following requirements:

1. The estimated initial number of subscribers is 5000 users and it should be able to increase up to 10000 in two years.
2. Subscribers are distributed over the whole country. But the service center will be in a one place (i.e. Damascus City).
3. Initial required services are. but not limited to:
   - E-mail service.
   - WWW service including browsing and hosting..
   - FTP service.
   - News service.
   - DNS service.
   - Chat service.

4. The bidder should propose. as a part of the solution, support of provisioning of supplementary and value added services deemed of value for the service. The bidder should focus mainly on providing the following applications:
   - VOIP (Voice over IP).
   - E-commerce.
   - IP switching, routing and VPNs.
   - Video on demand.
   - Other applications (tele-medicine. tele-education, instant video conferencing and other video services).
5. The design of the STE-ISP network should be scaleable to accept more users and new services. Expansion should be easy and cost effective. to handle the forecasted number of connections for the second year and beyond.
6. The proposed solution must be reliable and highly secure against any type of attacks. including internal and external attacks.
7. The configuration must have sufficient redundancy to ensure carrier class 24x7 operation without interruption of service.
8. The proposed solution should be user friendly for operators and administrators.
9. The proposed solution should be supported with authentication and billing systems to create and manage users accounts for STE-ISP subscribers.

- The system should provide facilities for the support of message security and authentication, such as digital certificate support. These facilities are normally provided in standalone e-mail clients, but must also be supported in the web interface.
- The system should support auto reply of messages e.g. vacation notification. It must also support it must support forwarding of messages.
- The system should provide server and user level message filtering support ("anti-spam" services).
- The e-mail servers should be capable of bouncing undeliverable mail to a particular e-mail address, returning a notice of delivery failure to the sender, or both.
- The server should be capable creating and managing e-mail groups.

7-1-2-2- Web service
- Web server should include off-the-shelf application-layer software for web service (http/shttp requests).
- The web server should support SSL version 3 and 4, with a minimum of 128 bit asymmetric key length.
- The web server should support multiple virtual hosting arrangements, as well as language fall over and server-configurable error messages
- The web server must be robust, commercial-grade software, and must include external application integration such as searching in databases, customizable pages, and registration for STE_ISP users.
- The server should support CGI, JAVA and ActiveX.
- The server should support pages created by popular web authoring tools, such as Microsoft FrontPage.
- The server should support LDAP.
- The server should support all web publishing standards, including http 1.1
- The proposed solution must allow web-hosting users to remotely update their pages.

7-1-2-3- Usenet service
- The service should be NNTP compliant
- The service should scale to Usenet proportions, with the possibility to handle 25,000-plus news groups with a multi-gigabyte total message volume
- The service should allow the creation of local discussion groups
- The service should allow users to read discussion groups through mailing lists
- The service must have a management interface that allows the creation, deletion of news groups, and canceling of news articles.
- The service must allow access restriction to authorized users and hosts.

7-1-2-4- DNS service
- The DNS service must allow the definition and registration of sub-domains.
- The DNS server should support DNS hosting capability.
- The service should be redundant through the use of a primary and secondary DNS service to insure a total availability.

7-1-2-5- FTP service
- The bidder should provide a complete description of the proposed service, including hardware and software supplier, product name, and version number of the server.
- The server should be able to handle 50 concurrent ftp sessions at least. It must allow the definition of a maximum number of concurrent ftp connections to prevent performance drop.

- The bidder should describe additional FTP features such as anonymous login, login, etc.
- The system should support security features that will be used in providing and restricting the service. Include features such as preventing unauthorized access, limiting outside attacks, and encryption of ftp content.

7-1-3- Authentication and billing
- Authentication server should be RADIUS based server. The authentication server checks every user name and password on the access to allowed him/her to access to the appropriate service if he/she is registered user.
- The authentication server should generate access record to each user which include access data (e.g. Date, Time and Access period).
- The provider should provide off-the-shelf billing software that connects to the authentication server, and enables STE-ISP making bills for its users.
- The billing software should be reliable, robust, secured and testified. And it must have several levels of security (e.g. Password, and several administration levels)
- The billing system must have suitable GUI in English and as an option in Arabic. And it must be able to support Arabic character for bill form.
- The billing software should be dynamic to support multiple type of billing such as:
  - Period of access
  - Group handling
  - Type of service
  - Flat rate. Etc.
- The billing system must be able to support at least 30000 subscribers.

7-1-4- Cache engine

The vendor should provide a cache engine to apply the security rules and to increase the performance of the system:
- The cache engine should be supported with multiple control levels such as: Network address, host name, UDP, TCP, ICMP, source/destination ports, direction: send/receive.
- The cache engine should be able to be upgraded with additional protection technique and to support new Internet protocols easily.
- The cache engine should be able to keep a log of accessed sites on the Internet. It must also be able to keep the log for a period of three months.
- It should be able to support 5000 simultaneous connections at least, and be expandable to support 16000 simultaneous connections at least.
- Initial throughput should be of 4 Mbps at least. The cache should be expandable to 10 Mbps at least.
- It must be able to server a minimum of 500 objects/second at least, with the possibility of expansion up to 1000 objects/second.
- It must have a minimal object hit ration of 40% and a minimal byte hit ratio of 40%.
- It should be easily programmable and configurable through a GUI based tool.
- It should have support for the ICP and ARCP protocols for communication between web caches.

7-1-5- Firewalling and security
  7-1-5-1- Firewall
  - The vendor should provide firewall solution to secure STE-ISP network and to provide the required protection for its users. The firewall solution has the following characteristics:
  - The firewall should have an outstanding performance estimated at 15.000 simultaneous connections at least.

- The firewall should be based on standard UNIX operating system, or on special embedded architecture, designed specifically for firewalling purpose.
- The firewall must allow the definition of several (at least 2) DMZ zones, where advertised services accessible from outside (WWW, email relay, ftp server) may reside. The bidder should specify number of Ethernet cards could be installed.
- The firewall should be scalable and redundant with Hot-Standby operation. System upgrade should be able carried out transparently with minimum interruption for security operations.
- The firewall must be able to define addresses and sites that are banned from access (i.e. Filtering mechanism). In addition to that, it must be able to define accessible ports and applications for the user.
- The firewall should be able to control number of accessible ports. Therefore it is able to close unusable ports making the performance of the system better.
- The firewall should have traffic management capability for the incoming and outgoing traffic.
- The firewall should be managed dynamically and locally or remotely.
- The firewall should be configured and managed using GUI tools easily and it should have the capability to gives the administrator a report on the traffic, source and destination addresses ...etc.
- The firewall should be able to generate alarms in real-time for any attempted firewalls breaches through e-mail and on the system screen.
- The bidder should state number of Ethernet port in the system and specify the maximum number of ports that can be installed in the system.
- The firewall should support Virtual Private Network VPN by using standard security and encryption protocols such as but not limited to IPSec and IKE.
- The firewall should be able to control type of the software which allow user to access to the system or access to the Internet
- The firewall should be able to watch accessed sites on the Internet and it must be able to store log history of at least 3 months. If the log gets full, it should not overlap, to avoid loss of records, but rather stops logging and issue an alarm to the administrator.
- The firewall should allow content monitoring with optional blocking of incoming data, esp. executable content: ActiveX and Java.
- The firewall should have intrusion detection capability. In case a hacking attempt is suspected over a certain port, it should shutoff access to that port for a predefined period.
- The firewall should have protection levels: PAP, CHAP, CHAP Callback, Token card CLID, local, and UNIX RADIUS and extended RADIUS password.
- The bidder should provide a full list of known attacks that the firewall can resist. The bidder will also provide a list of known vulnerabilities for the proposed firewall, along with all information about the risk level of these vulnerabilities and plans for fixing them.
- The firewall should have the possibility to run in NAT mode, and the bidder should describe the performance impact on turning NAT on.

7-1-5-2- Virus Scanning
The vendor should support the system with virus scanning capability. The virus scanning should have the following specifications:
- It shall use the Content Vectoring Protocol.
- It shall check any incoming and outgoing SMTP (or any other mail protocols) traffic for viruses.
- It shall be able to support FTP, HTTP and others Internet protocols.
- The virus definition database shall be capable automatically updated nightly.

7-1-6- Network Management
- The vendor should provide a network management system for managing STE-ISP LAN. servers and other equipment.
- The management software shall be SNMP and MIB-II compliant.
- The entire system shall be flexible enough to accept new equipment and software.
- The system shall be able to monitor bandwidth.
- The system shall be able to monitor services load and status.
- The system shall be automatically give reports. statistics, and graphs.
- The system shall be able to issue alerts depending on threshold levels and detected failures.
- The system should be capable of remotely receive and store required performance information about the usage and allocation of STE' ports from the NOC (especially RAS NMS). The bidder should provide detailed explanation of how this can be carried based on his proposal for the Internet backbone and STE ISP. In addition to alarms and faults indications and information.
- The system should be capable of remotely accessing and receiving all necessary performance information about the usage of the allocated bandwidth on the Internet backbone (especially the Internet gateway) from the NOC. In addition to alarms and faults indications and information.
- It is preferable to provide as an option, the possibility for accessing the management system at the NOC for very limited and secured management capabilities in relation of the STE ISP allocated connections. bandwidth and ports.

7-2- *Technical specifications for STE ISP*

7-2-1- Web cache

The vendor may propose a solution based on a web cache appliance or a proxy server, provided the solution meets service requirements mentioned in the previous section. In addition to performance figure already described. the web cache must have a storage capacity of 15 Gbytes at least. expandable to 30 Gbytes at least.

7-2-2- Servers

The vendor should quote a price for five servers to provide Internet services:
1. A cluster of two servers, providing Web service and DNS1 with load balancing between the servers. In case one server becomes faulty. the other should take over automatically without interruption for the services.
2. Email server and DNS2
3. Usenet and FTP server
4. Standby server which will take over the email and Usenet server in case of failure.

The bidder should provide the best configuration to fully meet the requirements and implement the services described in item /7/, guaranteeing an outstanding performance and QoS. The following general requirements are considered as MINIMUM REQRUIEMENTS:

1. Servers must be based on UNIX SYSVR4 operating system.
2. The standby server should work as a hot standby backup server. It should replace the faulty server as soon as the failure is detected.
3. Servers and storage units for all servers should be supported with Ultra Wide SCSI bus.
4. Vendor should define clearly the number of available drive bays for each server.
5. Servers should have support for multiprocessing. It should be able to accommodate at least 2 true 64 bits processors (The 64 bits refers to the width of data bus. internally and externally).

6. Servers should comply to the following benchmark specifications:
   - Specweb/95: should be at least 2500 ops/s and scalable up to at least 5000 ops/s.
   - Specintrate/95: should be at least 160 and scalable up to at least 400.
7. Each server should be equipped of 512MByte ECC-RAM at least expandable to 2Gbytes at least.
8. Each server should be supported with at least one CD ROM drive and one 3.5" floppy diskette driver.
9. The power supply of each sever should be redundant.
10. Each server must be supported with an internal management system especially for automatic fault diagnostic and recovery, statistics and power and environment management.

In addition to the above requirements, the Web server cluster should be equipped with a RAID5 storage server, of 5x16 GB drives, to be shared between both servers.

7-2-3- Router specification

7-2-3-1- The proposed routers should be flexible, scalable and fully manageable (on-site or remotely).

7-2-3-2- Router should support IP packets routing protocols such as but not limited to:
- RIP (RFC 1058).
- RIP ver2 (RFC 1723).
- OSPF ver2 (RFC1583).

7-2-3-3- It should have self-diagnostics tools to ensure good operation before going online. In addition to automatic diagnostics following the detection of errors as a result of built-in auto-test.

7-2-3-4- The bidder should explain the relationship between all components (including but not limited to processing capabilities & router memory) and the following router capabilities:
- Throughput
- Routing tables
- Latency

The router should be delivered with sufficient installed memory to fully meet current estimated payload and traffic based on the bidder suggested network design. The bidder should detail all assumptions and models used in calculating founding estimations.

7-2-3-5- The bidder should guarantee that the maximum capacity of memory that could be installed into the router is sufficient for future expansions of the international link to the Internet and growth of Internet traffic. He also should provide pricing information for expansion modules in his financial offer.

7-2-3-6- It should have installed flash memory to enable remotely, fast and reliable software updates.

7-2-3-7- It should have NVRAM for system configuration information.

7-2-3-8- It should be equipped with redundant power supply for protection against system interruption.

7-2-3-9- It should support 19" Rack mounting capability.

7-2-3-10- Router software should assure reliable internetworking by supporting LAN and WAN protocols, and should be online configurable.

7-2-3-11- The router should support fast booting capability after software updates or system reboot, which should not exceed 40 s.

7-2-3-12- The bidder is also required to completely describe in details the following points:
- Router protocols
- Routing tables capacities
- Routing speed and latency
- Throughput capability

- Processing power and limitations
- Router dimensions
- Power requirements
- Required operation environment

7-2-3-13- Router should support "L2TP" protocol to open tunnels between RASs and STE-ISP router via the PDN. The bidder should state clearly the maximum number of tunnels that can be served in the router at the same time.

7-2-3-14- Router should be supported with at least two WAN ports with the following characteristics:
- Type of connection: E1 (2.048Mbits/S)
- Carrier: Copper line using HDSL modem
- Protocol: ATM UNI ver 3.1 or ver 4.0

7-2-3-15- Vendor must describe clearly the scalability of the wan ports. And type of ports that can be supported.

7-2-3-16- Router must be supported at least with one port Fast Ethernet Port (100Base T).

7-2-3-17- Router should be SNMP manageable; preference will go for implementation of an SNMP v3 complaint agent. The contractor should deliver the full specification of the proprietary Enterprise MIB with the product.

7-2-3-18- Router should support VPN tunneling and IP Sec encryption for secured connections.

7-2-4- Workstations

The bidder should provide 5 workstations needed for the exploitation of servers. The workstations are distributed as follows:
- Two workstations for servers and network management.
- One workstation for authentication.
- One workstation for backup archiving
- One workstation for billing

All workstations should have the minimum following requirements:
- One 300MHz 64 bits RISC processor
- 256 KB external cache
- 128 MB of RAM
- 3 x PCI slots
- 1x10/100 Mbps auto-sensing Ethernet Network Interface
- Fast-Ultra Wide SCSI controller, with external connector
- 2x 4 GB hard drives
- One serial port at least
- One internal CD-ROM and one 3.5" floppy drive
- 8 bits Graphic controller
- 21" Color monitor
- UNIX SYSVR4 operating system

In addition to the above requirements, the archiving workstation should have one external 4mm DDS3 DAT jukebox with 6 tapes capacity, along with 50 empty tapes. A network-aware archiving system should be installed to allow incremental or full periodic backup of server data. Backups may be programmable on a daily, weekly, and monthly basis.

The vendor should supply the system with five personal computers from the latest version dedicated for customers support and help. PCs should be supplied with computer telephony equipment.

7-2-5- Local Area Network LAN Equipment:

7-2-5-1- The bidder should provide sufficient fast Ethernet cards for servers and author equipment in order to connect systems' parts.

7-2-5-2- The bidder should provide Fast Ethernet switch as a central node to realize the proper networking for the STE-ISP equipment.

7-2-5-3- The proposed switch should be equipped with a redundant power supply.

7-2-5-4- Full redundancy on the ports of the switch with hot-standby operation, so if a port has failed the other will take over instantaneously.

7-2-5-5- The port capacity of the switch should be scalable and has not less than 6 fast Ethernet ports as a reserve capacity.

7-2-5-6- The bidder should provide the required length for Category5 UTP cable to connect LAN equipment.

7-2-5-7- The bidder should provide installation of the required RJ45 outlets and they should be dual jacked. In addition to that, appropriate number of RJ45 cables is required.

7-2-6- Misc. equipment

One external 8-mm magnetic tape-drive, with 12 GB capacity at least. The drive must connect to the external SCSI connector of servers and workstations. Fifty empty tapes should be provided.

8- Y2K compliance

The bidder should provide details of the testing and compatibility with the year 2000 change of date for all types of the proposed solutions including all systems, equipment, nodes, devices, and tools HW and/or SW. These details should include information about the testing that has been performed and the level of guarantee that the bidder will provide against this stated year 2000 compliance. The bidder should detail compliance according to BSI and ISO standards, especially ISO/IEC 8601.

9- Installation Test and after sales support

9-1- *Support*

9-1-1- Bidder should provide details about his offered technical support for the proposed solution, demonstrating his ability for support up to ten years from date of installation.

9-1-2- The bidder should explain in details his support organization highlighting functions for support with major faults and in case of network or system down situation, and if any regional support centers exist, besides the technical support provided locally.

9-1-3- The bidder should detail the proposed integration and operation support services to be offered during the 2 years guarantee period (support for STE ISP of one year only / guarantee for 2 years). The services should aim at transferring the required know-how and expertise to STE (NOC And STE ISP) personnel to handle the OAM and services provisioning of the proposed solution. The bidder should set the work environment providing all required standard and customized work procedures, including but not limited to, customers handling OAM and service provisioning procedures, with detailed work scenarios.

9-1-4- The bidder should provide detailed plans (for the 2 years operation of the NOC and the one year for STE ISP) including a carefully designed plan for the transfer of know-how and expertise. The plan should include number of experts (stating their levels together with their profiles and qualifications) to stay over the first and second years, the supply of any required materials e.g. standard work procedures and work description materials. The bidder should demonstrate his abilities for conducting this transfer in the best possible ways.

9-1-5- The bidder should take into his consideration in the a.m. plans gradual transfer of management and operation responsibilities to STE personnel under his direct supervision and responsibility scaling up to reach 100% autonomy during the last 6 months.

9-1-6- The bidder should propose special marketing and sales supports, including but not limited to: Detailed scenarios of the possible customer solutions based on the proposed

network and services with full explanation of the network implementation and required equipment.

9-2- *Installation*

9-2-1- Bidder should describe procedures and methods for complete installation work of equipment and cabling of power and high frequency cables.

9-2-2- Bidder should make necessary survey to define suitable termination of E1 on digital distribution frame of transmission equipment and to define other requirement for overall installation or bidding work.

9-2-3- The offer must include all the necessary information concerning the site preparation for each network component installation.

9-2-4- STE engineers and technicians must participate actively in the installation phase with the contractor specialists.

9-2-5- The bidder should specify the shortest possible installation period, which should not exceed 4 months for all equipment.

9-2-6- Installation Schedule and plan should be submitted to STE one month prior to installation.

9-2-7- It is the supplier responsibility to describe the proposed method of connections, and should include in his offers all necessary hardware and/or software and/or cables, trunks or any other needed material or equipment for establishment the network solution.

9-2-8- Technical Documentation

The technical documentation including but no limited to detailed instruction for operation maintenance, layout and circuit diagrams, as built drawings, and system description should be delivered in one hardcopy and one on a CD ROM. The language of the documentation should be English.

9-3- *Test equipment [optional]*

9-3-1- The bidder should suggest any test equipment that is necessary for proper O&M functions. The quantity of the provided equipment should be enough to handle all provided network and services.

10- Spares & Warranty

10-1- *Spare parts*

10-1-1- The bidder should quote for the supply of a sufficient quantity of spare parts including all necessary printed circuit boards and consumables for 5 years maintenance based on 24 hours daily running. The bidder is to guarantee the sufficiency of the spare parts for 5 years following the warrantee period.

The value of the spare parts should be 10% of the equipment value.

10-1-2- The bidder should attach with his tender a complete recommended list of spares detailed unit prices should be included in financial part.

10-2- *Warranty*

10-2-1- The bidder should guarantee all proposed systems and equipment for two years warranty starting after the issuance of the Provisional Acceptance Certificate. During this period the contractor must maintain the equipment and software in complete operation. During warranty period the contractor must provide all new versions.

10-2-2- During the warranty period and under maintenance contract, the Supplier is required to provide spare parts as required free of charge, or supply replacement equipment of equal or superior functionality.

10-2-3- The supplier warrants that the goods supplied are new, and both hardware and software form part of the manufacturer's current product line.

10-2-4- STE should promptly notify the supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the supplier should, with all reasonable speed, repair or replace the defective goods or parts thereof, without any cost to STE.

10-2-5- If the supplier, having been notified, fails to remedy the defect(s) within a reasonable period as specified in the tender documents and/or contract, STE may proceed to take such remedial action as may be necessary, at the supplier's risk and expense and without prejudice to other rights which STE may have against the supplier under the contract.

10-2-6- The supplier must provide the following warranties:
- The equipment proposed is complete in every way.
- The supplier should replace any defected component free of charge during the warranty period.
- All modifications will be uniform with those given to other users.
- The hardware/software specification, capabilities and performance characteristics are as stated in the Supplier's proposal and accompanying documentation.
- The supplier will offer to STE all technological and software updates, new releases and upgrades, hardware spare parts, and cost reductions and facilities which are offered to other clients in Syria during the contracts signature.
- If the supplier is acting directly for the manufacturer of the goods and Services, the manufacturer must honor these guarantees. The manufacturer must submit a separate letter to that affect.

10-2-7- The correction period during the warranty period should not exceed 3 days.

10-2-8- The supplier should optionally quote in the financial offer for the cost of warranty for an additional 1-year period.

10-2-9- The supplier should state if he provides a life time warranty for all the proposed switches and the conditions of such a warranty. A life time warranty against design and manufacturing errors and faults is a must.

11- Training

11-1- General conditions

1. Training courses should be carried in the manufacturer's sites and certified training centers. The bidder should provide and commit to a list of selected training centers along with their credentials and history.

2. All courses should be completed with its materials and conducted by certified trainers.

11-2- *Courses Subjects*

Course Subject	NOC Trainees	ISP Trainees	Monitoring Trainees	RAS O&M Trainees
No. of trainees	10 trainees	8 trainees	4 trainees	5 trainees
OS Basics	*	*	*	

Advanced OS (for administrators)
    Shell programming
    Performance Monitoring
    Security Management
    Resources Management
    User Management
    Storage Management
    Administrating Network Connectivity
	*	*		

Networking Basics
    Basic Network Layers (7 OSI Layers, TCP/IP Model)
    LAN & WAN Definitions
    Devices & Interconnection
    Internet Protocols
	*	*	*	

Network Management
    Network Management Principles
    Protocols
    Tools
    Specific Tool Set Training
    Basic Router Configuration
	*	*		

Advanced Network Management
    Network & Internet Security Management
    Advanced Router Configuration
    RAS Management
	*			

Firewall Management	*	*		

Web Hosting & Publishing
    Web Page Design
    HTML
    JAVA Script
    CGI
		*		

Internet Servers Management		*		
Monitoring system training			*	
RAS O&M				*

12- Environmental conditions

12-1- *Power*

12-1-1- All proposed equipment should have minimal power consumption. The bidder should state the maximum power consumption for all types of offered equipment based on -48

VDC power supply. And he should also state the requirement for the proposed equipment supply.

12-1-2- STE will provide in all sites a -48 VDC (with possible variation of +15% and -10%) power source if the stated consumption was with the approved limits depending on site by site case. The bidder should provide the connection from STE power distribution panel to the system; average distance is 50 meters for each site.

12-1-3- The bidder should provide as an option a power supply system in each site with inverters and batteries for 4 hours of full operation at peak load.

12-1-4- The offered system and equipment should be fully protected against electrical defect that may result from the outage of the power supply. The input of the power supply units for each system should be provided with necessary protections for surge and variation in voltage and current.

12-1-5- The system should set itself automatically out of service when the battery voltage drop to less than 20% to avoid any damage to the equipment. The bidder should describe fully initialization of the system form a power down situation in a minimum time with all connections configured. The time should not exceed 2 minutes limits.

12-2- Conditioning

12-2-1- The bidder should state the radiated heat and heat dissipation of the proposed equipment specifying required conditioning per site.

12-2-2- STE will provide conditioning in all sites if the stated requirement is within the limits of what STE already have in place on site by site case.

12-2-3- The bidder should provide as an option a conditioning system in each site based on the requirement of the proposed equipment.

12-2-4- The environmental conditions should comply with Bellcore GR-63-CORE, GR-1110-CORE.

12-2-5- Conditions for normal operation

12-2-6- All components and equipment should be able of operating within the following specified limits without the need for any conditioning system and without any adverse effects on the performance of the equipment:

    12-2-6-1- Long term (year round) temperature and humidity range:
        12-2-6-1-1- Temperature: +5° C to 40°C.
        12-2-6-1-2- Humidity (rel.): 10% to 80%.
    12-2-6-2- Short term (not less than 72 hours and for 15 days a year) temperature and humidity range:
        12-2-6-2-1- Temperature: -5° C to 50°C.
        12-2-6-2-2- Humidity (rel): 5% to 90%.

12-2-7- The system should set itself automatically out of service if the a.m. limits were exceeded in order to avoid any damage to the equipment. The bidder should describe fully the initialization of the system afterwards when the conditions return to normal limits. specifying the values for out of service and in service decisions. The initialization should take place in a minimum time with all connections configured. The time should not exceed 2 minutes limits.

12-2-7- The system should set itself automatically out of service if the a.m. limits were exceeded in order to avoid any damage to the equipment. The bidder should describe fully the initialization of the system afterwards when the conditions return to normal limits, specifying the values for out of service and in service decisions. The initialization should take place in a minimum time with all connections configured. The time should not exceed 2 minutes limits.

12-3- *EMC*

12-3-1- EMC and EMI should comply with ITU-T K.32 K.37 K.38, ANSI C62.41, Bellcore GR-1089-CORE. and ETSI EN 50082 as a minimum requirement.

Damascus August 1999

Approved by: Director General

Eng. Makram Obeid

5-8-99

Annex /1/

Annex /1/ ATM switches specifications

1- ATM switches specifications
1-1- Services requirements

1-1-1- The network services and capabilities should be based on the applicable ATM Forum IETF and ITU-T specifications e.g. I.211.

1-1-2- All services and capabilities provided and/or supported by the proposed switches and equipment should be based on well-defined standards and should be possible to offer across other suppliers' switches and across other networks, assuming they support the established standards.

1-1-3- The bidder should state clearly the standards applied in defining specifying implementing and using of all services and capabilities provided and/or supported, or otherwise if they are based on a proprietary application he should include detailed description of the services' support by other suppliers.

1-2- *Minimum set of services supported*

The proposed switches should support the following services as a minimum requirement:

1-2-1- ATM Cell Relay Services. CRS
The cell relay services should be provided based on the full protocol stack of B-ISDN / ATM reference model as per recommendation I.321 and the latest ATM Forum specifications. e.g. af-saa-0048.000. af-saa-0069.000. af-saa-dlpi-0091.000. and af-saa-0108.000. In addition to the support of specifications under development e.g. ATM Name server V 2.0, and Java API.

1-2-1-1- Classes of Service
The proposed switches should provide the following classes of service conforming to the latest IETF and the latest related ITU-T standards & ATM Forum specifications, as a minimum requirement. The bidder should explain in details the proposed switches support and implementation of voice, data and video services:

1-2-1-1-1- Constant Bit Rate (CBR)
1-2-1-1-2- Real Time Variable Bit Rate (rt-VBR)
1-2-1-1-3- Non-Real-Time Variable Bit Rate (nrt-VBR)
1-2-1-1-4- Available Bit Rate (ABR)
1-2-1-1-5- Unspecified Bit Rate (UBR)

1-2-1-2- Virtual Connection Support
The proposed switches should provide the following end to end connections based on the latest available ITU-T recommendations and ATM Forum specifications with the possibility of each individual VC configured with its own QoS profile:
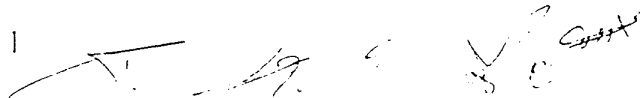1. Switched virtual connections, SVC.
2. Permanent virtual connections, PVC.
3. Soft permanent virtual connections. SPVC
Permanent virtual connections are administered by the operator but established only upon activation by the subscriber, and switched virtual connections are requested by the subscriber. determining the destination address and other parameters to initiate the call. An SPVC is a permanent connection initialized by the management but the path is not predetermined until the user activates the link sending required information.

1-2-1-3- Virtual Path support, with the possibility of each individual VP configured with its own QoS profile:
1. Permanent virtual path, PVP.

1

2. Soft permanent virtual path, SPVP
3. Switched virtual path, SVP

1-2-1-4- Bearer services support according to ITU-T and latest ATM forum specifications, as a minimum requirement.

1-2-1-5- Supplementary services support

   1-2-1-5-1- The bidder should list all the supplementary services that can be provided by the proposed switches based on B-ISUP supplementary services Q.2730, in addition to listing the available supplementary services based on the latest ATM forum specifications e.g. af-cs-0102.000, the bidder should list all supported services including but not limited to closed user groups, CUGs.

1-2-1-6- The switches should support virtual private networking of several user' sites. So to act as a private network with own shortened addressing privacy of connections, and support of high transaction rate, with customized set of services.

1-2-2- Circuit Emulation Service

The proposed switches and systems should have the ability to provide Circuit Emulation Service (CES) to transport framed or unframed signals at constant bit rates across an ATM-based multi-service network. Circuit Emulation should fully conform to the latest ATM Forum Circuit Emulation specifications including but not limited to CES V2.0, af-vtoa-0078.000, and af-saa-0032.000.

1-2-3- Managed IP Services Routing and Switching

1-2-3-1- General

   1-2-3-1-1- The application is mainly centered around providing the required data infrastructure for the national Internet network.

   1-2-3-1-2- The bidder should describe in details how the proposed switches will provide the best support of IP internetworking over a switched PDN in terms of maximizing performance, leveraging the switched infrastructure, minimizing control overhead and processing, and avoids unnecessary manual or operator intervention.

   1-2-3-1-3- The proposed solution should implement the current standards while allowing flexible cost efficient implementation of forthcoming standards that supports IP switching and Routing as they become available, in order to increase the efficiency of IP over ATM by eliminating the overlapping in layer 3 functions and minimizing the overheads involved. Examples of such forthcoming protocols are multi-protocol label switching, MPLS, and multi-protocol over ATM, MPOA with support of large scale Internetworking over ATM based on integrated PNNI, I-PNNI.

1-2-3-2- The proposed switches should provide:

   - The required connections and bandwidth for the interconnection to the public Internet (through the international link).

   - Interconnection between several licensed Internet service providers, ISPs and the main international gateway, which is run by STE.

   - Internetworking between the Internet access nodes and the service provision nodes.

   - Internetworking between Intranet and Extranet networks (including LAN based Intranet, and VLAN running IP), and switching internetworking between IP based VLANs.

   - And to provide access to the Internet for several big customers with high bandwidth requirements.

2

1-2-3-3- The proposed switches and equipment should deliver advanced managed Internet Protocol (IP) services. IP traffic should be mapped to ATM Virtual Connections (VCs), preferably using SVCs or SPVCs. The ATM VCs will be set up dynamically by the system as required to forward the IP traffic

1-2-3-4- VCs setup should be made using the latest ATM signaling standards, e.g. B-ISUP and PNNI (including PNNI augmented routing, PAR, PAR V 1.0 af-ra- 0104.000, and proxy PAR as the standards becomes available), and possibly DSS2, and UNI 4.0/ UNI 3.1

1-2-3-5- To resolve IP to ATM addresses, the proposed switches and network should support the following classical IP over ATM solutions:

   1-2-3-5-1- RFC 1483, logical link control and VC multiplexing and ATMARP of classical IP and ARP over ATM, CLIP according to the latest version RFC 2225 and the older version RFC 1577.

   1-2-3-5-2- Next Hop Resolution Protocol (NHRP) according to RFC 2332

   1-2-3-5-3- Multi-cast address resolution protocol, MARS, according to RFC 2022.

   1-2-3-5-4- Server cache synchronization protocol according to RFC 2334

1-2-3-6- The bidder should demonstrate the ability of the proposed switches and network to implement the latest IP/ATM address mapping in order to provide more efficient IP over ATM solutions for large scale switched PDN. In order to do so, the switches should support the following standards being under development as it becomes available.

   1-2-3-6-1- The extension of OSPF based on link state routing, LSA, according to RFC 2370, and address resolution advertisement, ARA.

   1-2-3-6-2- PNNI extension, PAR, PAR V 1.0 af-ra- 0104.000, and proxy PAR being under work in ATM Forum signaling sub-working group

   1-2-3-6-3- The future MPOA with support of large scale Internetworking over ATM based on I-PNNI, which integrate both IP and ATM routing. Providing full operability on ATM switches and routers.

   1-2-3-6-4- The MPLS, working as another control plane supporting IP switching.

   Besides the above mentioned the following standards and features should also be supported:

   1-2-3-6-5- Encapsulation
   IP packets are mapped onto ATM cells according to the LLC/SNAP case described in RFC 1483.

   1-2-3-6-6- Routing Protocols
   Standard Routing Protocols, i.e. RIP V1 and V2 (RFC 1058 and RFC1723), OSPF V2 (RFC1583), and BGP (R3FC1771) are supported

1-2-3-7- The bidder should illustrate the ability of the proposed network and switches to support IP V6 over ATM, detailing his current and planned implementations.

1-2-3-8- Access
   Access to IP services should be possible over the following service interfaces as a minimum requirement:

   1-2-3-8-1- ATM
   The proposed system should support routing of IP V 4 packets received over ATM PVCs encapsulated using the routed PDU encapsulation defined in RFC 1483. The inverse ATM Address Resolution Protocol (ATMARP, RFC1577/2225) should be supported, besides other protocols as listed in item /1-2-3-5-/ and /1-2-3-6-/.

3

1-2-3-8-2-   Ethernet

The proposed system should support IP V 4 packets over Ethernet or IEEE 802.3/SNAP as defined in RFC894 and RFC1042 respectively. The system should implement the Address Resolution Protocol (ARP) defined in RFC826 to provide dynamic translation of IP addresses to Ethernet/802.3 MAC addresses.

1-2-3-9-   Bridged LAN interconnection

Apart of the routed IP services described above, the proposed switches and systems should also provide bridged LAN interconnection, i e virtual LANs, VLAN, based on IEEE 802.1Q. The protocols supported in bridged VLAN should include and not be limited to IP, IPX, AppelTalk, and DECnet. The proposed switches and systems should also provide VLANs based IP

1-2-3-10-   Management

The IP services should be managed over the same unified network management platform at the network operation center similar to the other services provided and the ATM equipment itself.

The setup of VPNs and the assignment of users/ports to these VPNs should be possible via simple point and click operations over graphical user interface, GUI, at the network management system.

1-2-4-   Virtual Private Networks and Network Partitioning and Security

1-2-4-1-   General

The proposed systems should support VPNs, allowing the partitioning of the proposed network and the allocation of specific resources to a virtual network, it should also allow both separate viewing and management of the virtual network. The following types should at least be supported based on the operated protocol over the ATM network:

- IP-based Virtual Private Networks (VPN), e.g. to provide corporate network services for various enterprise customers over one network platform.
- Cell relay based VPNs, please describe in contrast with the a.m. CUG.
- VLANs.

Different ports, users and applications should be possible to be assigned to different VPNs by the network management.

1-2-4-2-   Separation of traffic

The bidder should describe how security is achieved in the proposed solution. As a minimum requirement to assure security for the data transmitted in each private network, traffic in different VPNs will be separated on the ATM layer, i.e. different ATM VCs will be used for different VPNs.

1-2-4-3-   Separation of Routing Contexts

To hide the existence of other subscribers from the users of each private network, separate routing contexts are maintained for the different VPNs. E.g. Private IP address spaces can be used within the VPNs and the address spaces of different VPNs may overlap.

1-2-4-4-   Please describe in details the following aspects of the provision of VPNs on the proposed network:

1-2-4-4-1-   Billing.

1-2-4-4-2-   Management segmentation.

1-2-4-4-3-   Bandwidth configuration and management with protection for the network and other users.

1-2-4-4-4-   Security.

1-2-4-5- Please state the maximum number of VPNs per each type that can be supported by the proposed network. And the maximum number of VPNs subscriber per each VPN and per the proposed system.

1-2-4-6- Individual VPNs should be managed both from the network management system and by the customer himself.

1-2-4-7- The offered network should produce all necessary accounting records and statistics for billing of the usage of the networks. The minimum required is the ability to record and rate the usage by individual customers. With the resulting information being transferred to the billing system.

1-2-5- LAN emulation, LAN services over ATM, (Ethernet, token ring), virtual LAN, V-LAN, and emulated LAN, E-LAN

The proposed network and systems should provide LAN interconnection based on latest ATM Forum specifications, e.g.: af-lane-0021.000, af-lane-0057.000, LAN-E V2, LANE v2.0 LUNI af-lane-0084.000, af-lane-0093.000, and LANE v2.0 LNNI af-lane-0112.000. In addition, they should provide compliance with MPOA specifications af-mpoa-0087.000 and af-mpoa-0092.000, and support of MPOA v1.1 being under development. Please describe in details specifying available support for Ethernet, Token ring, FDDI, and any other protocols.

1-2-5-1- The bidder should at least specify the proposed network and systems support for the multi-protocol over ATM, MPOA, and RFC1483 encapsulation protocol.

1-2-5-2- The bidder should specify the functions performed the proposed systems as of LAN bridging routing and switching.

1-2-5-3- The bidder should specify the number of ports supported by the proposed network, and if it can provide emulated LAN across different protocols

1-2-5-4- The proposed network and equipment should support LANE redundancy and scalability features such as Distributed LAN Emulation. Please explain in details.

1-3- *Quality of Service*

1-3-1- General

1-3-1-1- The proposed switches should handle multiple types of traffic, copping with traffic bursts without degradation of offered QoS.

1-3-1-2- The bidder should describe in details the support of the proposed systems for different QoS framework and classes.

1-3-1-3- The bidder should specify the models and architecture followed in providing the QoS protocols and requirements. The bidder shall explain the implemented architectures and/or models; such as IETF integrated services group architecture Intserv, including but not limited to RFC 1633, ITU-T X.641 ISO/IEC OSI QoS framework (JTC1/SC21/WG1 N9680), and the TINA QoS framework.

1-3-1-4- The bidder should specify if end-to-end quality of service guarantees can be supported for the specified minimum set of services.

1-3-1-5- Please indicate if the proposed solution guarantees bandwidth, delay and cell loss levels to provide different quality of service classes for different applications needs for the minimum set of services including cell relay.

1-3-1-6- The bidder should specify the requirements imposed on network performance design and planning to meet the desirable QoS.

1-3-2- The bidder should specify the maximum rate of data delivery, in case the proposed switches has been fully loaded and extremely busy. Please describe how call and connections priorities can be used to guarantee the committed rates in such a case.

1-3-3- For each VPN, different Classes of Service (CoS) can be defined for the different IP Classes of Service within the system. ATM VCs with the specific service category will be established by the system as needed whenever a user demands a particular CoS.

1-3-4- ATM Service Categories

ATM services are used to reserve the necessary resources for the different IP Classes of Service within the system. ATM VCs with the specific service category will be established by the system as needed whenever a user demands a particular CoS.

1-3-5- Single Hop and Multiple Hop Routing

The system will set up ATM VC shortcuts to assure short packet delay times for high quality Classes of Service. A packet forwarded over a shortcut connection passes only one IP routing instance (single hop routing).

For a lower quality CoS, multiple hop connections can be used. In this case, an IP packet passes several routing instances before reaching its destination.

1-3-6- The proposed switches and equipment should provide high level of customer satisfaction based on offered quality of service. The bidder should details the proposed network support for QoS specifications, including but not limited to:

- Flow performance specification (user flow performance requirements).
- Level of service, specifying end-to-end resources commitment (e.g. deterministic, predictive, and best effort).
- QoS management policy, (capturing the degree of QoS adaptation).

Cost of service, (specifying the cost for obtaining the required level of QoS).

1-4- Numbering and addressing

1-4-1- The numbering and addressing should fully conform to the related ITU-T recommendations and ATM Forum specifications including but not limited to, E.164, E.164.1, E.165.x*, E.191, X.121, af-ra-0105.000, af-ra-0106.000, and UNI v4.0 addressing addendum af-cs-0107.000.

1-4-2- Describe the proposed network addressing flexibility including if logical & physical addressing are supported and if Addressing tables can be built automatically, describe in details the procedures to build the addressing tables.

1-4-3- Describe in details the proposed ATM addressing capabilities including what type of NSAP addresses are supported

1-4-4- The proposed switches should provide/support IP ATM address resolution or mapping capability as listed in items /1-2-3-5-/ and /1-2-3-6-/

1-4-5- The proposed switches should provide address analysis of E.164 in a faster time than specified in E.162, please specify the estimated time taking into consideration the switch and network load of 25%, 50%, 75%, and 100%.

1-5- Network performance

1-5-1- The bidder should explain in details the dependency relation between switches performance measures and criteria and the offered QoS.

1-5-2- switches Delay

Explain in details the total end-to-end delay in the proposed switches (port-to-port) including, but not limited to the following:

Propagation

Buffering & queuing techniques

Processing (call processing switching or routing time)

Safeguarding techniques against degradation of QoS as a result of traffic bursts.

State time needed to switch a 128-byte payload in ATM cell in your switches @25%, 50%, 75%, and 100% switch load.

1-5-3- Delay should be predictable based on the collected statistics and management information, leading to predict the proposed switches' performance.

1-5-4- The bidder should state the highest speed and throughput for ATM interface that can be supported in the proposed switches.

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* Wherever in this RFP x is used with a recommendation or specification number it refers to all the set of the recommendations including all available recommendations numbers from 0-9.
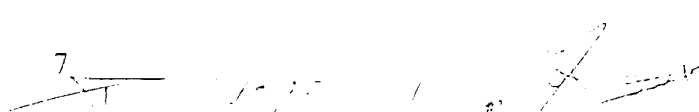
1-6- *Routing*

1-6-1- The proposed switches should support IP routing as per items /1-2-3-5-/ and /1-2-3-6-/, please explain in details your current or future implementation.

1-6-2- The proposed switches should support the following routing schemes/algorithms:

    1-6-2-1- Dynamic routing according to the latest ATM Forum specification including but not limited to af-pnni-0055.000, PAR af-ra-0104.000, and call rerouting (as specifications become available).

    1-6-2-2- Static routing based on the latest ITU-T recommendations including but not limited to E.177

1-6-3- The bidder should describe in details all the implemented or supported routing schemes/algorithms used in the proposed switches clarifying the following:

    1-6-3-1- Indicate the ATM routing-engine forwarding rate per port for the proposed switches

    1-6-3-2- Routing tables must be built automatically with all associated information, describe in details.

    1-6-3-3- Virtual connections must be automatically re-established in case of link or node failures, describe in details.

    1-6-3-4- The proposed switches must implement a distributed routing architecture & not rely on any centralized routing mechanisms. (I.e. the routes should be determined automatically by the nodes themselves, based on actual network conditions (line availability, traffic loads, routing preferences, and so on).

    1-6-3-5- Explain if the distributed routing tables are per switch, per I/O module or per port.

    1-6-3-6- No reserved bandwidth is needed for rerouting, explain in details

    1-6-3-7- The proposed solution must automatically update all node(s) changes to the network in real-time. These changes include as a minimum the addition or deletion of nodes, trunks, connection acknowledgement, clocking parameters & alarm conditions, describe in details.

1-6-4- The proposed switches should support End-to-End dynamic routing for PVCs (i.e. PVCs are not required to be individually mapped as cross-connects at each individual switch across the network.

1-6-5- The bidder should specify the rate that virtual circuits can be re-routed after the occurrence of trunk link failure. It should specify the time it takes for the proposed switches in the worst case (power failure) to reroute all PVCs & SVCs to the backup trunk, assuming 1000, 2500, 4000 PVCs configured, accepted range (1 sec - 1 min).

1-6-6- The proposed path routing scheme/algorithm should support the following:
1. Moving traffic along the shortest & best path.
2. Low overhead scheme.
3. PVC path rate monitoring & congestion consideration.
4. Dynamic resource tracking, including the committed information rate & excess.

1-7- *Signaling*

The following standards should be fully supported and complied with based on latest available versions as a minimum requirement:

1-7-1- Full support for the ATM protocol stack including but not limited to:

    1-7-1-1- I.363.x, I.365.x, and I.366.1 AAL specification And AAL signaling based on Q.21xx, and Q.2210

    1-7-1-2- I.361, ATM layer specification for user network interface.

    1-7-1-3- I.414, I.432.x, physical layer specification.

1-7-2- User to network interface signaling

    1-7-2-1- ATM Forum V4.0, V3.1, V3.0, based on latest ATMF specifications e.g. af-sig-0061.000, af-cs-0107.000, af-tm-0056.000, V3.0 af-uni-0010-002, af-uni-0010.001, and UNI V4.0 security addendum (as specifications become available).

All proposed user interface cards should support automatic sensing for the user equipment UNI version and automatically adapt to it.

1-7-2-2- ITU-T DSS2 for access signaling, user network interface signaling system based on Q.2931, and Q.29xx.x.

1-7-3- Network to node interface signaling

1-7-3-1- ATM Forum PNNI V1.0 and its latest version that are either under progress or to be published, e.g. af-pnni-0055.000, af-pnni-0066.000, af-pnni-0075.000, af-pnni-0081.000, af-pnni-0026.000, and af-cs-0102.000.

1-7-3-2- ITU-T B-ISUP for network signaling based on Q.27xx.x

1-7-4- In addition the switches should support network to network interface as per the following:

1-7-4-1- ATM Forum B-ICI V2.0, for internetworking with other PSDNs, based on latest ATMF specifications, e.g. af-bici-0013.003, af-bici-0013.002, af-bici-0013.001, af-bici-0013.000, and af-bici-0068.000.

1-7-4-2- B-ISUP based on I.581 general arrangement for B-ISDN internetworking.

1-7-4-3- The bidder should details the support and implementation of inter-networking among ATM networks, ATM Inter-network Interface, AINI, especially the support of B-ISUP and PNNI inter-working. Based on latest ITU-T and ATM forum specifications.

1-7-5- Signaling inter-working

1-7-5-1- B-ISUP and DSS2 Inter-working based on Q.2650.

1-7-5-2- B-ISUP and N-ISUP inter-working based on Q.2660.

1-7-5-3- The bidder should details the support of B-ISUP and PNNI inter-working. Based on latest ITU-T and ATM forum specifications. AINI as specifications become available.

1-7-5-4- The bidder should explain in details the proposed switches' support to ATM forum inter-working specifications, including but not limited to the ICS proforma for ATM trunking using AAL1 and AAL2 for Narrow-band services.

1-7-5-5- In addition the bidder should describe the:

1-7-5-5-1- Support for I.525, I.580, I.581 B-ISDN inter-working

1-8- *Accounting and Billing record generation*

1-8-1- All services and capabilities supported by the proposed switches should be able to bill and account for, i.e. billing and accounting records are generated by each of the proposed switches and for each of the services offered. The billing record generation should be possible to set by the administrator to count for time and usage (amount of data transferred).

1-8-2- The proposed switches should produce a standard based billing records format based on the automatic message accounting, AMA, established standards, e.g. Bellcore AMA format requirement GR-1100-CORE. However the systems should also allow proprietary formats based on customers request.

1-8-3- The billing record should at least contain the following information:

1-8-3-1- Address and/or number of calling and called party (E.164, X.121, E.191).

1-8-3-2- Services used including the use of supplementary services

1-8-3-3- Class of service used in data exchange, e.g. ABR etc...

1-8-3-4- Exchanged cells or frames count, with path usage.

1-8-3-5- Time and date of the call and/or connection including duration of it.

1-8-4- It should be possible to provide meter charging based on pulsed timing periods that its basic duration period can be set by the administrator for each type of services and supplementary services. The switch should perform the counts of metering units per each call based on service type, source and destination, class of service, supplementary services used, etc.

1-8-5- All proposed switches should support local storage of billing records (data) in two files on the main storage device Each should have the capability to save up to one month of the billing records (assuming high traffic volume) on the hard disk When the file is near full size, it should be downloaded to the external storage device, e g optical disk.

1-8-6- The files should be transferred from each of the switches to the eventual billing system. Billing records should be transferred collected and managed by the network management system, NMS Before transferring the files to the network management or the billing system, each of the switches should download its backup copy to the external storage device Transfer and collection of billing records should be carried in-band, with the possibility to support out-band transfer, if needed Please describe in details the transfer and collection process including, the unique addressing of each switch file, integrity, and confidentiality of the information stating the error rate for the in-band link.

1-8-7- The bidder should describe the support of the proposed solution to instantaneous billing in the near future, where billing charges can be advised to customers as the AMA record is produced after finishing the call or as it is processed by the eventual billing system. N.B. the bidder is not required to provide any kind of billing system.

1-9- Technical specifications

The bidder should demonstrate the abilities of all proposed switches to meet the following general requirements in minimum:

1-9-1- All proposed systems and equipment should be of modular hardware and software design, providing the ability for future smooth development insuring forward compatibility and backward compatibility. The bidder should demonstrate the backward compatibility history, and major strength points that support the claims of forward compatibility with future products

1-9-2- Full advantage should be taken of latest techniques and technologies to attain high performance and reliability, including but not limited to:

1-9-2-1- Flexible upgrade

The proposed solution should allow STE operators to upload and/or download upgraded software from the management system directly to any node or card allowing flexibility to upgrade the system without traffic interruption. In addition the proposed systems should support the possibility of loading any system SW from a common points either directly or indirectly in case of unavailability of the management system, the bidders should state any required on site operations to allow remote loading of SW, e g pins or dip-switch settings. The switch should also be able to be built up to maximum HW & SW configuration without affecting any existing in-service traffic, explain in details.

1-9-2-2- Hot Swappable Replacement

The system HW should support hot swappable replacement of any HW modules without the need to affect not related services operation and without resorting to initialize the system reboot or recovery

1-9-2-3- System Dependencies

The removal or addition of any interface cards should not disrupt the traffic carried by or the proper operation of any other cards within the system. The bidder should provide all details about any types of equipment or cards that may affect the operation of other equipment and cards in case removed modified or added.

1-9-2-4- The proposed equipment should be of modular construction utilizing plug-in units. Such plug-in units should be secured in place to prevent being dislodged by shock or vibrations.

1-9-3- Displays

All units should display status information easily visible from the front. A LCD panel should indicate a fault on that port, card, unit, or system displaying a fault code, which can be used in fault analysis

1-9-4- Power Down/Up

All configurations should be stored within the system such that in the event of a power down individual node/switch configurations should not be lost. The bidder should provide details of how this is achieved including description of the functions type of stored data and the characteristics of any non-volatile memory used in the system.

1-9-4-1- The system should initialize from a power down situation, with activation of all configured connections, in as short time as possible. The bidder should provide details of this timing

1-10- *Availability and reliability*

1-10-1- The switches must be designed so as to be essentially and fundamentally safe against failure. Variations in what is intended by the term fail-safe, however, constitute an important distinction between the services that are provided. For clarification, the following grades of relative fail-safe operation are defined.
- No part of the network service can fail during specified operational periods except as a result of a major disaster or catastrophe. Although individual elements of the network (e.g. individual PC's) may indeed fail, the basic service continues to operate.
- As stated above, a major service failure is not allowed, but transient service outages for individual users can be accepted
- Degraded operation (such as higher response times) in some or all parts of the network service can be permitted, within well-defined limits (contracted QoS).
- Complete system service failure is not precluded, but the probability should be low, and restoration must be possible
- Complete system service failures are possible, no specific counter - measures are taken during the design phase, but tools and procedures exist to affect restoration (best efforts operation)

1-10-2- The proposed switches should have high reliability for all its parts and components. The bidder should state the availability figure for the switch based on the MTBF and MTTR for each part or components and the availability of a completed call end-to-end across the switch (port to port). The calculated figure should at least meet the STE requirements for 99.9%. The bidder should explain models used and the calculations made referencing it to well-established standards or procedures applied by well-known test labs.

1-10-3- The bidder should describe in details the methods and processes applied for fault isolation and handling in the proposed switches. The system should automatically isolate any detected fault (HW and/or SW) prohibiting it from affecting other parts of the system, and guarantying graceful degradation for system performance and the quality of service. Carrying out diagnosis and handling of the faulty parts should not affect the performance of the switch or lead to fault spreading.

1-10-4- Switch operating software must be remotely & locally downloadable.
A single component (HW or SW) failure of the node should not cause a node outage. The switch should be designed for full-time service (i.e. No scheduled down time for routine maintenance), describe in details.
Please describe the mechanisms used to load new operating software to a switch. Please describe under which circumstances software can be remotely loaded from any point in the network, and specify if any limitations to remote loading is founded, (i.e. restricted to loading from a management station). Also describe when software has to be loaded directly to the device.
The bidder should determine the effect of loading software, both remotely and locally on the operation of the device & the network.

1-10-5- The bidder should describe the system recovery process and levels. Please describe in details the levels of system failures and the types and phases of the triggered recovery process, e.g. partial reload of a program unit or block, or total reload for all the system SW from one of the backup devices. The system should have several alternatives and full capability to initialize from a total system failure situation. Please specify the

maximum recovery time (having all configured connections back and active) for each of the recovery phases and for each of the used backup devices.

1-10-6- Please specify the recovery effects in terms of traffic flow, responsiveness to user requests, and loss of connections forcing the re-establishment of the session again on all types of calls and connections (SVC, SPVC, PVC, SPVP, and PVP) considering the following cases

- Established calls and connections at the time of recovery.
- Calls and connections being under establishment at the time of recovery.
- Requests for calls and connections at the time of recovery.
- Calls and connections being cleared down at the time of recovery.

1-10-7- The bidder should describe in details the backup (the download of all the system operating SW) system of the proposed switches. The backup system should have a redundant flash RAM backup (equipped with batteries for 2 hours), a fully redundant hard disk and extra optical backup devices. It should be possible to do backup centrally to the network management system.

1-11- *Switches specifications*

All proposed switches should fully meet the following as a minimum requirement, please details your reply:

1-11-1- The switch architecture must be Modular and Expandable, describe in details.

1-11-2- Describe in technical details the proposed switch architecture including the following:
Control system
Switch Fabric, back-plane switching
Internal Data Format (i.e. Cells, frames or can be both at the back-plane)
System bus architecture
Switching architecture & how your routing decisions are taken (HW OR SW).
System scalability
Buffering
Throughput
Redundancy
All protocols, interfaces and services supported

1-11-3- The proposed switches should be ATM based switches, i.e. they are based on cell switching techniques, where payloads are switched in cells not frames or packets.

1-11-4- The proposed switches should handle the estimated payload, the bidder should specify the control system load including processor load and system bus occupancy at peak hour based on the forecasts made. The bidder should state clearly any assumptions made or any models used to derive the requested figures. The calculated load must not exceed 50%.

1-11-5- The proposed switches should have high availability, including but not limited to: fully non-blocking switch fabric, fully non-blocking back-plane switching. The bidder should state clearly the proposed switch capacity, throughput, and any blocking probability for the different service types at peak hour for an end-to-end call terminated on the same switch and for a call terminated at another switch.

1-11-6- The bidder should state the internal latency, maximum switch delay, average switch delay and delay variation for different types of services, all calculated at peak hour assuming full capacity configuration. The bidders should also include the required test procedures to verify the stated figures upon commissioning.

1-11-7- The bidder should explain any assumptions made or any models used in calculating the throughput, delay, and delay variation. He should also include the detailed calculations

for the dimensioning of any parts or components (SW/HW) of the proposed system that may affect the capacity of the system or its throughput. Including but not limited to: processing power, switch Fabric, buffering per connection port and switch, speeds of internal links and buses and capacity, signaling control, and processing time for translation and routing. While address analysis time should comply with E.162 or better.

1-11-8- The bidder should state all parts and components (SW/HW) that may affect system throughput or availability.

1-11-9- The proposed switches should have all common parts or components (HW/SW) that may cause a total system failure (no traffic/payload handled) fully redundant, including but not limited to: the switch fabric, control and main processor, common buses, clock, and power supply. Describe the switchover in case of failure determining how long does a processor switchover take. The switchovers should not result in call connection or application interruption.

1-11-10- The bidder should specify the following for each of the proposed switches, taking into consideration the redundancy and availability requirements:
- Maximum number of slots available for interface cards, and all types of cards and ports that can be used in the proposed switch. Specifying number of ports per card, total processing power (MIPS), and throughput.
- Maximum number of physical & logical User ports per switch if fully equipped (in non-blocking configuration) & their respective speed.
- Maximum number of ATM cards that can be supported in each switch and their maximum speed.
- Maximum number of SVC/PVCs per Switch.
- Maximum number of SVC/PVCs per physical port.
- Maximum number of point-to-multi-point connections per switch.
- Maximum number of point-to-multi-point connections per physical port.
- Maximum number of SVC end –to-end calls (considering both calls' set-up and clear down) handled per second. e.g. not less than 1500 calls, and number of signaling processors.
- Maximum number of Trunks per switch.
- Maximum number of Chassis that can be clustered.
- Maximum number of Switching and processing cards supported in a single chassis.
- Maximum number of multicast VCs, Indicating how to support multicast.
- Maximum number of PVCs on ATM Trunk.
- Maximum size of Switch memory.
- Maximum size (in cells) of input and/or output buffer per switch.
- Maximum size of input and/or output buffer per port, calculating the effective buffer size per port (Trunk or Access). The bidder should explain the calculations of buffer effectiveness, actions taken when port buffers are overflowed and the effect on the switch, burst percent at which the switch begins to drop packets, and the threshold level to consider the buffer overflowed.
- Maximum size of input and/or output buffer per VC.

1-11-11- The proposed switch should have a distributed architecture based on open distributed environment. The bidder should details any standards adopted and met by the proposed system, including but not limited to: ISO/ITU-T open distributed processing, ODP's recommendations X.901, X.902, X.903, X.904, X.920, X.950, and X.952, in addition to TINA-CORBA specifications, TINA open distributed environment.

1-11-12- Describe if your system support symmetrical multiprocessing, detailing its implementation. Explain in details if traffic management, queuing, SVCs call processing & multicasting can be distributed among the switch modules.

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1-11-13- The bidder should describe in details the effect of system overload and high processor occupancy on the above mentioned system performance criteria, especially throughput, number of calls handled per second, delay, and loss of data. Please explain in details the protection measures taken against overload and functions and traffic prioritization scheme applied in case of overload

1-12- *Switch technical specifications capacity and throughput*

The proposed ATM switches should be scalable switches in a cost-effective way. The proposed switches should meet the following capacities:

1-12-1- An initial capacity not less than 2.5 Gb/s. for switches

1-12-2- The possibility to expand to not less than 10 Gb/s without the need for major changes, the bidder should specify any required changes modifications or additions (in SW and/or HW).

1-12-3- The bidder should state the maximum expansion capacity for the proposed switches specifying any changes modifications or additions (in SW and/or HW) that are required to meet the maximum capacity

1-12-4- Services and protocols support
    1-12-4-1- The switch should support at least the related signaling protocols as per item /1-7-/, and the related services offered as per item /1-2/.
    1-12-4-2- The switch should support encapsulated IP traffic tunneling, managed IP service including IP address resolution and routing as per item /1-2-3/.
    1-12-4-3- The switch should support MPOA and distributed LAN emulation LAN-E V 1.0 (Ethernet and token ring), VLAN and LUNI V 2.0
    1-12-4-4- The switch should support all available classes of service based on item /1-2/, including but not limited to CBE, rtVBR, nrtVBR, ABR with ABR-ER, and UBR with load balancing.
    1-12-4-5- The switch should support, as a minimum, multi-cast and broadcast, the point to multi-point and other connections listed in item /1-2/, e.g. SVC, unlimited VPI/VCI, per VC queuing and shaping, CLP, EPD and PPD, and Dual leaky bucket UPC and NPC.
    1-12-4-6- Scalable statistical multiplexing of ABR/UBR
    Statistical Multiplexing should ensure reliable and efficient throughput of VBR, ABR, and UBR traffic. It should be implemented according to ATM Forum V4.0 with large buffers on a modular base.
    1-12-4-7- The switch should support, as a minimum, ATM layer multi-point connections and ATM layer O&M functions

1-12-5- Protocols and Interfaces supported and rates
    1-12-5-1- The bidder should details all types of protocols and interfaces supported by the proposed switch clarifying the following in minimum:
        1-12-5-1-1- Number of ports per each interface card.
        1-12-5-1-2- Whether the interfaces and protocols to customer side is proprietary or standardized.
        1-12-5-1-3- If any switch port can be configurable by software to support any protocol i.e. to be trunk, user access, NNI, or UNI.
        1-12-5-1-4- If any switch port can support any protocol or service offered by means of SW configuration.
        1-12-5-1-5- All NNI electrical switch ports should have G.703 75ohm BNC connector. For optical interfaces, the related ITU-T G series specifications should apply.

    1-12-5-2- User Network Interface
        1-12-5-2-1- The proposed switch should provide ATM UNI according to items /1/, /2/, and /3/ and the following

1-12-5-2-1-1- ATM forum UNI 4.0, UNI 3.1, UNI 3.1 with auto sensing for the customer used version

1-12-5-2-1-2- ITU-T related UNI specifications I.413, and I.36x.x.

1-12-5-2-2- The proposed switches, as it is intended for supporting customers access, should provide at least the following physical UNI according to ATMF and ITU-T I.432.x, the bidder should list all available options and number of ports per card.
- E1 ATM, and E1 IMA.
- ATM DXI, ATM FUNI
- CE E1 and E3 channelized and un-channelized.
- ATM E3, and STM-1
- ATM over xDSL, e.g. HDSL according to G.991.1 and SDSL, and ADSL according to draft rec. G.992.1 or G.992.2 interfaces for connection to customers over 0.4-mm² copper wires for a distance not less than 6 KM.
- The bidder should state clearly if any of the interfaces is based on the a.m. standards or if it is proprietary. He should also describe the effect on end-to-end management for each case, and if compatible NTU products are not largely available in the markets from several different suppliers as an off the shelf product. In such a case the bidder should provide the network termination units NTUs accordingly, quoting the price separately.

1-12-5-2-3- The number of ports has to meet the requirements and distribution as per item /5-4/. Distribution of the requested quantities on services should be based on the bidder practical experience and best price performance balance.

1-12-5-3- Node to Network Interface

1-12-5-3-1- The proposed switch should provide ATM NNI according to item /1-7/:

1-12-5-3-1-1- ATM forum PNNI 1.0

1-12-5-3-1-2- ITU-T related specifications.

1-12-5-3-2- The proposed switches should provide, at least, the following physical NNI according to ATMF and ITU-T (SDH interfacing), the bidder should list all available options and number of ports per cards:
E3, STM-1, and STM-4.

1-12-5-3-3- Number of ports is mainly 2 STM-1 between the two switches (one in Damascus and one in Aleppo).

1-12-5-4- The bidder should provide all necessary connection material to STE transmission system taking into consideration that the switches are going to be located on a distance about 50 meters form the transmission equipment. The bidder should provide in average 50 meters of required cabling, cables is preferred to be supplied in roles to be cut on site according to the practical distance.

1-12-5-5- The bidder has to provide necessary connections, including necessary distribution frames and xDSL modem pools and interfaces, for ISP ports to STE main distribution frames MDF for access to the local loop 0.4-mm² twisted pair copper wires, located within an average 50 meter distance from the switch.

1-13- *ATM switches management*

1-13-1- The bidder should provide as part of the NOC an element manager for the management for the operation, administration, maintenance and provision, OAM&P, of the proposed switches. The element manager should preferably integrate with the management system provided in the NOC. In case such integration is impossible, the bidder should provide standalone EMS and describe the potential for integration with the future NMS of the public switched data network.

1-13-2- The bidder should provide a state of the art element management system, EMS that is capable of managing the proposed switches including all services and equipment.
The EMS should be a flexible and serves as an open platform for interoperation with other future network management systems form different vendors for integration within

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STE public switched data network's NMS. Therefore, the proposed EMS should be based on a well-established standard that can guarantee the full management of the resources (physical and logical) This is achieved through obtaining a generic view of the resources, where different vendors' systems can be fully interconnected independently from the implementation technology used in the realization of the managed resources.

1-13-3- Management standards

    a- All network elements' management view and models should be based on well-established standards. Preference will be given to ATMF SNMP v.2, SNMP v.1 models, if not then preference is given to the ATM forum CMIP based models, and ITU-T TMN based models, respectively.

    b- All implementations should fully comply with NMF programs' requirements, namely, open management interoperability point, OMNIpoint, and service provider integrated requirement for information technology, SPIRIT. Please explain in details if applicable.

1-13-4- ATMF SNMP based NM

For a system to implement the ATMF SNMP based management, all proposed switches and its element management system should fully comply with and adopt the requirement and interface specifications M4 of management information flow between a network node and the NMS. The modeling should be made using the defined managed objects, MO, that are listed in the SNMP V1 or V2 management information base, MIB, based on the latest RFCs. The bidder should specify whether the proposed solution implement V2 or V1 and possible interoperability between them based on the available standards.

1-13-4-1- All proposed systems and equipment should fully comply with the published and under development standards of the ATM forum, including but not limited to: af-nm-0080.000, and af-nm-0095.001, and the related items of af-nm-0019.000, af-nm-0020.000, af-nm-0020.001, af-nm-0058.000, af-nm-0071.000, af-nm-0074.000, and af-nm-0103.000. In addition to M4 requirements & logical MIB network view V2.0 specifications for the M4 interface V2.0.

1-13-4-2- Use should also be made of IETF RFCs specifying the SNMP and MIB for V1 & V2, including but not limited to: RFC 1157, RFC 1695, RC 2011, & RFC 1907, and the applicable items of RFC 1573, RFC 1657, RFC 2011, RFC 2012, RFC 2013, & RFC 2096.

1-13-4-3- If because of the lack of defined MO or for providing comprehensive management services, the bidder has chosen to use of a non defined MO. He should derive the required MO from an existing MO class following the rules defined in the IETF RFCs.

1-13-4-4- In such a case the bidder should be committed to release all necessary information of any proprietary MOs upon STE request to be used for interoperation with other management systems. He should also be committed to modify the proposed solution on his own cost to use the defined MO whenever it becomes available.

1-13-5- ATMF CMIP based NM

For a system to implement the ATMF CMIP based management, all proposed switches and its management systems should fully comply with and adopt the requirement and interface specifications M4 of management information flow between a network node and the NMS. The modeling should be made using the defined managed objects, MO, that are listed in the ISO management information tree, MIT, referred to with MI base, MIB.

1-13-5-1- All proposed systems and equipment should fully comply with the published and under development standards of the ATM forum, including but not limited to: af-nm-0027.000, af-nm-0072.000, and af-nm-0073.000, and the related items of af-nm-0019.000, af-nm-0020.000, af-nm-0020.001, af-nm-0058.000, af-nm-

0071.000, af-nm-0074.000, and af-nm-0103.000. In addition to CMIP specifications for the M4 interface V2.0.

1-13-5-2- Use should also be made of ISO OSI CMIP and CMIS, based on X.7xx and X.28x series, wherever the defined models do not suffice the required management function or service. Transactions based on ACSE & ROSE and reliable transfer should comply with X.2xx and X.88x series. Directory naming and addressing should be based on X.5xx.

1-13-5-3- If because of the lack of defined MO or for providing comprehensive management services, the bidder has chosen to use of a non defined MO. He should derive the required MO from an existing MO class (using object oriented techniques) following the rules defined in the X.7xx especially X.722, guidelines for the definition of managed objects, GDMO, X.720 structure of MIM, X.721 definition of MI, X.723, and X.724. The bidder should state clearly otherwise, describing the MO created and the methods used.

1-13-5-4- In such a case the bidder should be committed to release all necessary information of any proprietary MOs upon STE request to be used for interoperation with other management systems. He should also be committed to modify the proposed solution on his own cost to use the defined MO whenever it becomes available.

1-13-6- ITU-T TMN based NM

For a system to implement an ITU-T TMN based management, all proposed switches and its management systems should fully comply with and adopt the generic and specific MIM as defined in the ITU-T recommendations, i.e. both the managed objects and management system should fully comply with the model. They should perform the modeling by using the defined managed objects, MO, that are listed in the ITU-T/ISO management information tree, MIT, referred to with MI base, MIB.

1-13-6-1- All proposed systems and equipment should fully comply with the published and under development standards of TMN, including but not limited to:
M.3020, M.3100, M.3200, M.3208.1, M.3207.1, M.3300, M.3320, M.3400, M.3610, M.3611, I.751, Q.823, Q.824, Q.824.6, and Q.825.

1-13-6-2- Use should also be made of ISO OSI CMIP and CMIS, based on X.7xx and X.28x series, wherever the defined models do not suffice the required management function or service. Transactions based on ACSE & ROSE and reliable transfer should comply with X.2xx and X.88x series. Directory naming and addressing should be based on X.5xx.

1-13-6-3- If because of the lack of defined ITU-T's MO or for providing comprehensive management services, the bidder has chosen to use of a non ITU-T's MO. He should derive the required MO from an existing MO class (using object oriented techniques) following the rules defined in the X.7xx especially X.722, guidelines for the definition of managed objects, GDMO, X.720 structure of MIM, X.721 definition of MI, X.723, X.724, and the methodologies set in M.3020. The bidder should state clearly otherwise, describing the MO created and the methods used.

1-13-6-4- In such a case the bidder should be committed to release all necessary information of any proprietary MOs upon STE request to be used for interoperation with other management systems. He should also be committed to modify the proposed solution on his own cost to use the ITU-T's MO whenever it becomes available.

1-13-7- The bidder should explain in details the proposed nodes and switches support for a fully defined management interface across the UNI interface, such as M3 and whether it is SNMP or CMIP based. The bidder should specify to what degree other vendors' NTU or access products can be managed from the same platform.

1-14- *Management system interoperability*

The proposed element manager should provide the necessary connections to other network management systems namely the PDN network management system that is to be provided as part of public RFP for the PSDN, As both of the ATM switches is intended to be integrated with the PSDN once in place. Interoperability of the proposed solution should be implemented to allow connections to third party network management system.

1-14-1- Therefore all adaptation functions for the connection of different network elements with different NE management view to future PDN NMS should be integrated in the element manager, including but not limited to:
- SNMP V1 to SNMP V2, and managing other IP based nodes, e.g. routers.
- CMIP based M4 to SNMP based M4 and vice versa.
- Q3 adaptation function.
- M3 over the UNI interface for the management of customer premises NTU.
Please describe in details.

1-14-2- The bidder should be committed to release whatever required information to achieve the full-scale interoperability functions as illustrated without any additional cost.

1-14-3- The proposed NMS should provide high degree of modularity and flexibility to allow customization of management applications and services and/or integration of third party SW within the proposed platform. This implies the provision of GUIs APIs and third party MIBs that are easy to use interact and develop. The bidder should explain in details this function specifying the degree of customization through GUI, and all existing and possible API interfaces to other 3rd party product, and number of own and third party MIBs included.

List A

1. Computer equipment:
   - IBM RS 6000 H50 server with the following specifications:
   - 1 250 MHz CPU
   - 256 KB Cache
   - 512 MB RAM
   - 2x4.5 GB HDD
   - CD Drive
   - Tape Drive
   - 3.5" Floppy Drive
   - Ethernet Card (RJ 45)
   - IBM 20" Monitor
   - AIX Ver 4.3 Operating System

   - SUN 250 Enterprise server with the following specifications:
   - 1 250 MHz CPU
   - 2 MB Cache
   - 256 MB RAM
   - 4,2 GB HDD
   - CD Drive
   - Tape Drive
   - 3.5" Floppy Drive
   - Ethernet Card (RJ 45)
   - SUN 17" Monitor
   - Lynucs Operating System

   - SUN Station Ultra 30 Model 300 with the following specifications:
   - 1 300 MHz CPU
   - 2 MB Cache
   - 256 MB RAM
   - 9,1 GB Ultra SCSI HDD
   - External SCSI CD Drive
   - Tape Drive
   - 3,5" Floppy Drive
   - Ethernet Card (RJ 45)
   - SUN 20" Monitor
   - Solaris 2.5 Operating System

2. Routers and Switches:
   - Cisco AS 5300 equipped with:
   - Octal E1/PRI card with serial interfaces
   - 2 x MICA card
   - 20 x 6-Port Modem module
   - 10/100 Mbps Ethernet card
   - 10 Mbps Ethernet card
   - Cisco AS 5300 equipped with:
   - Quad E1/PRI card
   - 1 MICA board
   - 10 x 6-Port Modem module
   - 10/100 Mbps Ethernet card
   - 10 Mbps Ethernet card
   - Cisco 3640 Router
   - Cisco 3620 Router

Annex /2/

List of existing materials

- 3 x Cisco 2511 RAS
- 2 x Cisco Catalyst 1912 Switch with tow 100BaseT port each

3. 6 x MicroLan CSU/DSU
4. 3 x US Robotic Modem Rack (16 Modem each)
5. Cisco PIX Firewall with 2 Ethernet Cards

List B

Cisco Core router		
Cisco 7507/4	Cisco 7507 7 slots, 2 Cybus, 1RSP4	1
MEM-RSP-FLC 16M	RSP 4 flash card: 16 B	1
MEM-RSP4-256M	RSP 4 256 MB DRAM	1
PWR/7-DC	Cisco 7507 DC power supply	1
PWR/7/2-DC	Cisco 7507 dual DC power supply	1
VIP2-50	Versatile Interface processor 2 model 50	1
MEM- VIP 250-32 M-D	32 MB DRAM for VIP 2-50	1
MEM- VIP 250-4M-S	4 MB SRAM for VIP 2-50	1
PA-2FEISL-TX	2 ports fast Ethernet/ISL 100BaseTX port adapter	1
PA-A3-OC3 MM	1 port ATM enhanced OC3/STM-1 multi-mode port adapter	1
Cisco Distribution router		
Cisco 7507/4	Cisco 7507 7 slots, 2 Cybus, 1RSP4	1
MEM-RSP-FLC 16M	RSP 4 flash card: 16 B	1
MEM-RSP4-256M	RSP 4 256 MB DRAM	1
PWR/7-DC	Cisco 7507 DC power supply	1
PWR/7/2-DC	Cisco 7507 dual DC power supply	1
VIP2-50	Versatile Interface processor 2 model 50	1
MEM- VIP 250-32 M-D	32 MB DRAM for VIP 2-50	1
MEM- VIP 250-4M-S	4 MB SRAM for VIP 2-50	1
PA-2FEISL-TX	2 ports fast Ethernet/ISL 100BaseTX port adapter	1
Switches		
WS-C 29 24 M-XL-EN	24 port 10/100 switch w/two module slots (enterprise edition)	2
WS-X 29 14-XL-V	4- ports 10/100 ISL/802.1 Q switch module	2

Annex /3/

No 7 Signaling specifications

Annex (1)
SIGNALLING SYSTEM NO.7

1-   The offered signalling system NO.7 shall be according to the latest ITU -T recommendation (White book version 2).

2-   It must interworking with the existing NO.7 Supplied by Siemens, which is based on blue book ISUP - ETSI Standard. Some of the NO.7 document are attached. For more detail, bidders can obtain what they need from the Technical studies directorate in the S.T.E.