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Estimated Budget

Description	**in millions US$**
Total:	**13**

Brief Description:

This document focuses on presenting the Backbone Transmission Network solution for Djibouti. This transmission backbone network intends to cover the main cities. The network support broadband service, dada service and voice service access and transmission.

Based on current DWDM, NG-SDH service and latest IP technology, a flexible network construction and customized solution will be designed according to the requirements from DJIBOUTI

This technical proposal focuses on the equipment part of Backbone Transmission Network.

Technical Proposal for National Backbone Network

Prepared for:
Djibouti

Technical Proposal

Sep 2011

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1 GENERAL

1.1 Introduction

This document focuses on presenting the Backbone Transmission Network solution for DJIBOUTI. This transmission backbone network intends to cover the main cities. The network support broadband service, dada service and voice service access and transmission.

Based on current DWDM, NG-SDH service and latest IP technology, a flexible network construction and customized solution will be designed according to the requirements from DJIBOUTI

This technical proposal focuses on the equipment part of Backbone Transmission Network.

1.2 Transmission Backbone Network description

The National Backbone Network project covers 5 nodes, from WEA to Border. Total route distance is about 282 Km.The distance of the project is show in the table 1 .The network is constructed at two layers, with upper layer DWDM and bottom layer NG-SDH. In the initial stage, DWDM network is designed at a capacity of 40G, and can be upgraded to 3200G in future. When the project is completed, it will cover the main cities along the route and connect with Djibouti. In the meantime, it provides huge bandwidth for other operators, and meet the requirement of service increasing every year.

Table 1 Route length of the project

Start Point	End Point	Length(km)
Wea	Lac Assal	61
Lac Assal	Kalaf	62
Kalaf	Tadjioura	13
Tadjioura	Obock	60
Obock	Border	86
Total		282

The network is designed as the linear topology covering 5 nodes. Network route are shown as follow:

Figure 1 *Backbone network plan*

2 NETWORK SOLUTIONS

2.1 Design Principle

After the analysis of existing network and demand from DJIBOUTI, SUPPLIER plans to adopt DWDM+NG-SDH technology for the backbone network. NG-SDH system could multiplex/de-multiplex the STM-1, E1, GE & FE to 10G. DWDM system could transport SDH 10G by one wavelength. Refer to figure 3 for the network model: DWDM+NG-SDH solution for DJIBOUTI

In normal condition, the optical transmission network is designed in a multi-layer structure. In this project, it includes backbone layer and access layer both in a linear topology.

2.2 Civil Work Solution for Project

According to the requirement, we plan to construct optical fiber cable for backbone network project as shown in the following Figure 2.

Figure 2 *National backbone network Route*

2.2.1 Project scale and main workload

According to the solutions and preliminary survey, we plan to construct a total length of 282 km optical fiber cable for National Transmission Backbone Network. The planning result is listed in the table below.

Table 2 Length of the route and the O.F.C

	Section	Route (Km)	O. F. Cable (km)
1	Wea——Lac Assal	61	67.1
2	Lac Assal——Kalaf	62	68.2
3	Kalaf——Tadjioura	13	14.3
4	Tadjioura——Obock	60	66
5	Obock——Border	86	94.6
	Total	**282**	**312**

2.2.2 Capacity of optical fiber cable

Optical cable transmission system of this project adopts ITU-T G.652D optical fiber. As this project aims to build the transmission platform for the telecom services, there exists the possibility of selling or leasing out firbers resources. According to Somaliland economic development situation and potential demand for telecommunication, the OFC(optical fiber cable) is planned as the 24 cores cable.

2.2.3 Solution of optical fiber laying

There are many feasible ways to conduct the ODF installation: directly buried, duct and aerial etc. The route of cable is usually chosen along with the highway convenient for construction and maintenance.
——Directly buried cables, a measure to directly dig a ditch to bury the OFC.

——Duct cables, a measure to lay plastic duct along roadbed, then the cable is put through. Because placing duct on the road will include interrelated establishments; extra expense will be needed to pay for it, and this will make the cost of the project more expensive. Under road construction or reconstruction, cooperating with the company having property right, can reduce the duct cost. Another measure of long distance cable construction is to dig a ditch outside the road, put plastic ducts with silicon core, and then blow the cable into the plastic ducts by the use of high pressure air. When using the latter measure, landform's undulation should not be very large, and air compressor can work normally at the same time.

——Aerial cables, a measure to set up concrete poles, erect steel strands and then hang the cable. Because of the effect of ultraviolet, the cable life of this style is shorter than that of buried cables. At the same time, the acute change of difference in temperature can influence the transmission capability of these cables.

Compared with Duct method, The Directly buried OFC is more suitable for backbone and has a relatively lower cost, so SUPPLIER suggests adoptting Directly buried OFC in this project.

2.3 Solution of DWDM Network

After the analysis of current and future demands, SUPPLIER plans the DWDM network as follows:

2.3.1 Proposed Network Topology

In accordance with the architecture of backbone Network, general topology of the backbone transmission network is as follows:

2.3.2 Selection of the DWDM Equipment

*The network design is beginning with the selection of the equipments. The selection of equipment constructing the network should meet the present requirements and the smooth capacity upgrading of future several years. So the equipments adopted must have good expansion ability. Firstly, we consider the actual capacity requirement and the upgrade ability of DJIBOUTI, and we propose ZXWM M920 DWDM system with 40*10G configuration which has great upgrading ability. These upgrading procedures are relatively simple that only addition of optical transponder cards is necessary, and the common cards or the shelves of cabinet needn't any change.*

Once the equipments are decided, then we come to discuss the following issues such as line system design, multiple service access, optical layer protection etc

2.3.3 System Design of DWDM Networks

For the system design issue, it is needed to consider such factors as dispersion limitation, PMD limitation, OSNR limitation of optical transmission system and other non-linear effects, etc

2.3.3.1 Distance Limitation of Dispersion

*Dispersion includes light impulse distortion caused by optical line width, and chirping of optical source results in spread of signal spectrum. In this project, we use fiber G.652, whose dispersion per km is normally 20ps/ (nm*km), so we can calculate limited distance of dispersion according to the following formula:* $Ld=\varepsilon/Dm$ *(L=800ps/20ps/ (nm*km)=40Km)*

Limited distance of dispersion = dispersion allowance/dispersion coefficient.

At present, ZXWM M920 provides 10Gbit/s OTU with the dispersion allowance is 800ps/nm, which can support up to 40km transmission without dispersion compensation.

When the span distance is beyond the distance allowance, the dispersion compensation modular (DCM) is employed to increase the transmission distance

Table 4 is about detailed DCM compensation information.

Table 3 DCM Compensation of the DWDM Network

Segment number	Start Point	End Point	Dispersion Tolerance of OTU	Dispersion Limited Distance	Dispersion compensation	Actual Distance (km)
1	Wea	Lac Assal	400	20	67.1	67.1
2	Lac Assal	Kalaf	400	20	68.2	68.2
3	Kalaf	TadjouraH	400	20	14.3	14.3
4	Tadjioura	Obock	400	20	66	66
5	Obock	Border	400	20	94.6	94.6

2.3.3.2 Polarization Mode Dispersion (PMD) Limitations

PMD is caused by random double refraction of the fiber, that is to say the phase shift will be different because the refractive coefficient of the fiber is different, which ultimately expands the waveform of the optical pulse signal.

The PMD-limited distance shall satisfy the following formula according to ITU-T Recommendations (refer to Appendix I in G.691 for details):

$B^2 *PMD^2 *L<10^4$

When PMD coefficient is assumed as 0.5ps/km1/2, the PMD limited distance of 10Gbit/s OTM/OADM system would be about 400km, thus, the optical multiplexing segments should be designed less than this distance limitation, but which can be improved by applying some popular technologies such as AFEC, RZ etc in this project, the distance between two site is not over 400Km,so we do not consider it.

2.3.3.3 OA Configuration of the DWDM network

According to the technical requirements of tender, SUPPLIER designs all the DWDM parts as 40*10G networks.

Due to the receiving sensitivity of 10G system is lower (about -17dBm), in order to ensure the system sufficiency margin and stable running, the OPA design or configuration often adopts two level amplifiers, which can guarantee the receiving sensitivity of the system well.(now SUPPLIER adopt the new technology which integrate OPA and OBA into EONA, it can realize the former function that OPA and OBA act, at same time EONA only occupy one slot)

Table 3.2.2-2 listed the amplifiers type which applied in the 40*10G system (R-OADM).

*Table 4 The Amplifier Type of 40*10G DWDM System*

Optical boost amplifier (W band, 27dB\26dBm, OBA)	OBA-w2726
Optical boost amplifier (W band, 24dB\24dBm, OBA)	OBA-w2424
Optical boost amplifier (W band, 22dB\20dBm, OBA)	OBA-w2220
Optical preamplifier (W band , 25dB\20dBm, EONA)	EONA-2520
Optical preamplifier (W band , 33dB\20dBm, EONA)	EONA-3320

And the detailed rules of OA configurations are described as following:

The OBA configuration rules of OTM and OADM station:

Normally we adopting OBA-2220, HOBA2424, HOBA2726 amplifier.

The OPA configuration rules of OTM and OADM station:

Line loss<=17dB: configure SDMR + OBA2220

17dB<line loss <=30dB: configure EONA2520 (gain can be adjusted from 25 to 20~30)

30dB<line loss <=38dB: configure EONA3320 (gain can be adjusted from 33 to 28~38)

The line loss mentioned above is the total of fiber loss, line loss and DCM loss etc.

And the detailed information can be referred to the quotation of OA configuration and layout of rack files.The detailed OA configuration please refer to Figure 4

2.3.3.4 System OSNR Calculation

The OSNR of MS span is the key issue of signal transmission quality and due to the EDFA applied in DWDM system, OSNR of signal decreases level by level.

In the configuration, after selecting OA on the basis of each line loss, we must calculate the OSNR of MS span.

The detailed requirements of OSNR can be referred to table 3.2.2-3.

Table 5 The OSNR requirement of system

Rate	OSNR(dB)requirement
2.5Gb/s, without FEC	>20
2.5Gb/s, with FEC	>15
10Gb/s, without FEC	>25
10Gb/s, with FEC	>20
10Gb/s, with AFEC	>18
10Gb/s, with RZ	>15

For the system with optical amplifier, the calculation formula of OSNR at R point is described as below:

$$OSNR = P_{OUT\_1} - 10\,\mathrm{Log}(h\nu\Delta\nu_0) - 10\log\left\{\sum_{i=1-N} 10^{0.1NF_i}(G_i - 1)\prod_{j=1-(i-1)}\frac{1}{G_{j+1}L_j}\right\}$$

Where: POUT_1 is the single channel output optical power (dBm) of number 1 level EDFA, G_i is the gain of number I level EDFA, L_j is the line loss between number j-1 level EDFA output and number j level EDFA input,

Attention: the unit of G and L is not dB but actual amplified or attenuated multiple. (e.g. the gain or attenuation of 22dB, Gj+1 =158.5， Lj =0.0063). The bandwidth of optical filter is $\Delta\upsilon_o$, h is Planck constant, ν is optical frequency, the numerical value of $10\,\mathrm{Log}(h\nu\Delta\nu_0)$ is about 58. NFi is the noise index (dB) of number I level EDFA.

As to the only EDFA system, the NF of every level OA are basically similar, able to assume the every level OA might compensate the loss of preceding line, i.e. G_{j+1} =1/L_j, the incoming fiber optical power of single channel is related to the total output optical power of OA and system channel quantity Pout-1=Pout – 10logM, the above formula may be predigested as:

OSNR = Pout - 10logM+ 58dBm - Nf – 10 log (G1+ΣLoss)

Where, Pout is total incoming fiber power, M is the quantity of channel, L is line loss, Nf is the EDFA noise factor (Nf taking 5.5 dB), Loss is the loss of each optical fiber section (linear value), G1 is the amplified multiple of power amplifier (linear value).

In the system combined dual amplification system (OPA+OBA) with DCM or OADM and mono amplifier, calculate the OSNR with following formula:

OSNR = Pout - 10logM+ 58dBm - Nf - 10log(ΣGOBA+ΣGOPA×100.8＋ΣGOLA)

GOBA, GOPA, and GOLA are the amplified multiples (linear value) of power amplifier, line amplifier and preamplifier applied in the system. Because the currently designed OPA output power is 8dB (12dBm output) less than OBA, when calculate Pout according to 20dBm, above formula contains ×100.8 term.

For adopting distributed amplification technique, the noise created by Raman amplifier DRA during amplifying is less than the one created by EDFA, and its equivalent Nf is -2dB. Thus, replace EDFA with DRA in system, which will improve the OSNR, but with higher cost; that's why it is applied to the longest span of MS generally. At present, our DRA has 10dB gain. Calculate the OSNR of a system with DRA by following formula:

OSNR = Pout - 10logM+ 58dBm - Nf - 10log(ΣGOBA+ΣGOPA×100.8＋ΣGOLA +0.178×Lr)

Where, Lr is the preceding line attenuation (linear value) of DRA, 0.178=10(-2-5.5).

Table 6 describes system OSNR calculation result of the DWDM network based on WB (Wavelength Blocker) solution

Table 6　The OSNR of DWDM Network

Segment number	Start Point	End Point	Distance (km)	OSNR	
1	Wea	Lac Assal	67.1		
2	Lac Assal	Kalaf	68.2		
3	Kalaf	Tadjioura	14.3		
4	Tadjioura	Obock	66		
5	Obock	Border	94.6		

From above OSNR calculation diagrams, we can find the system OSNR of all spans of these DWDM networks are over 15dB, fully meeting the system requirements

2.3.3.5 Wavelength Assignment Design of DWDM Network

The wavelength channels of Link networks are allocated according to the existing state. We propose 1 wavelength at the link.

The detailed wavelength channel (Ch) assignment diagram of DWDM network is shown in Fig.5

2.3.3.6 Capacity Expansion Solution

For the capacity expansion issue, there are two main solutions: one is to decrease channels' spacing such as decreasing the channel spacing from 100GHz to 50GHz or even to 25GHz, thus we could obtain more channels for transport; the other one is to improve the transport capacity of each channel such as from 2.5Gb/s to 10Gb/s or 40Gb/s.

And for the different network applications, we could select the different capacity expansion scheme.

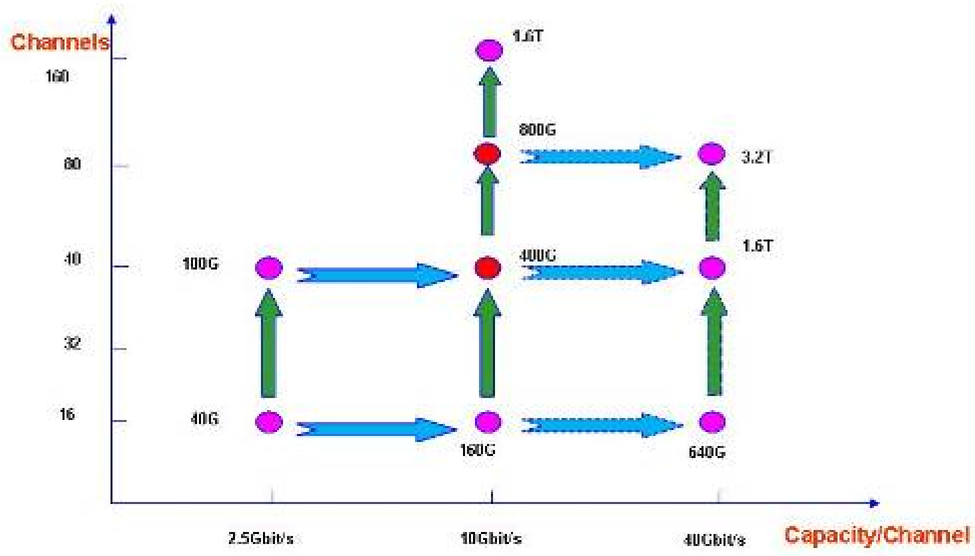

Figure 3 *Capacity Expansion Scheme*

2.4 Solution of NG-SDH Network

According to the service type we planned, the main service is GE/FE, STM-1/4/16 and E1. At the NG-SDH level, the system will access all the service and convergence to STM-64

The SDH level topology show in Fig3

2.4.1 Selection of equipment

SUPPLIER proposes to use the next generation SDH equipment ZXMP S385, which is designed with the concept of multi-service transport platform. ZXMP S385 is a sort of STM-16/STM-64 level advanced SDH equipment. It not only supports the traditional TDM service such as STM-N, E1/E3, but also the data service such as ATM, Ethernet as well. One of the most important features of ZXMP S385 is that it can be smoothly upgraded from STM-16 level equipment to STM-64 level equipment without interrupting the current service.

2.4.2 Optical power budget

The NG-SDH level base on the DWDM system, use DWDM lambdas for transmission. So NG-SDH optical power will not calculate. And SUPPLIER will provide DWDM OSNR value to DJIBOUTI.

2.4.3 Protection scheme

The protection mechanism of the transmission system can provide perfect protection: including hardware unit protection at NE level, and service protection at network level

2.4.3.1 Protection for Hardware Unit at NE Level

In this protection scheme, the important units are protected through hardware redundancy to enable equipment protection. If a working unit of the equipment fails, the system will automatically switch over from the working unit to the standby units, thus protecting services from being lost. Unit protections at NE level provided by ZXMP S385 equipments include 1:N

tributary protection including E1, E3 and electrical STM-1.E1/T1 board supports 1:N protection (N<=9), and E3/T3, STM-1 electrical and FE boards support 1:N protection (N<=4) for two groups; Besides the 1:N tributary protection, and ZXMP S385 can support 1+1 protection, that means 1+1 hardware redundancy backup for net control processor unit, cross-connect, synchronous clock and power distribution cards

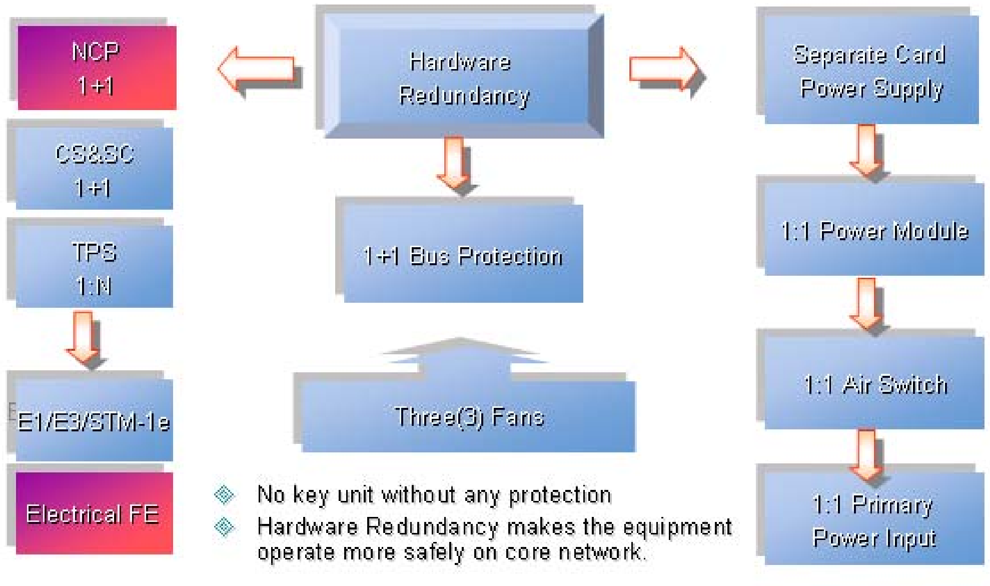

Figure 4 *Protections at NE Level*

2.4.3.2 Protection at Network Level

In the DWDM layer, the system protection is 1+1 protection, with the first wavelength working and the second wavelength protecting.

In the NG-SDH layer, ZXMP S385 can provide all networking features recommended by ITU-T. Protection modes include:

MSP (Multiplex Section Protection)

UPSR (Unidirectional Path Protection)

UPSR (Bidirectional Path Protection)

SNCP (Subnet Connection Protection)

LSNP (Logic Subnet Protection)

2.4.4 Solution to Synchronization System

Network synchronization is one of the important factors, which should be kept in mind while deigning and planning any network. Synchronization plays an essential role in NG SDH network. Optimized synchronization between NEs will not be realized without reasonable network

synchronization plan. The offered equipment ZXMP S385 provide synchronization solution based on SSM (Synchronization Status Message), which is used to make sure that effective timing sources of high synchronization quality will be selected by NEs, thus guaranteeing timing synchronization performance of the network.

The SDH network synchronization is closely related to the clock unit, and ITU-T stipulates three types of clocks. G. 811 stipulate the master reference clock; G. 812 stipulates clocks of all levels, while G. 813 specifies the slave clock of SDH equipment. The timing of all SDH systems should be traced on the basis of the original reference (PRC) described in G. 811.

The ZXMP series equipments are equipped with at least one external timing reference input. When the selected timing reference is failed, the NG-SDH equipment can automatically be switched to another timing reference input by means of the S1 byte.

NG-SDH network is capable of adding, dropping and re-routing signals, which brings about great flexibility. However, it results in complex network synchronization timing. The SSM enables NE to select effective timing resources of high synchronization quality, which prevents the occurrence of loop and guarantees timing synchronization performance of the network.

The offered NG-SDH equipment in the project can extract the timing signal and can provide this timing signal as a reference for synchronization of the whole network. It has two ports of 2 MHz and 2 Mb/s, 75-ohm (un-balanced) BITS interfaces or 120-ohm (balanced) BITS interfaces through a 75-120 impedance converter to extract the External Clock Signal.

2.5 Network Management Solution

NetNumen T31, the new generation network management system on NE management layer/ subnet management layer, is used to manage and supervise NE equipment in the bearer network.

NetNumen T31 adopts the distributed, multi-process and modular design. It can manage all SUPPLIER's optical transport products. It has such management function as configuration management, fault management, performance management, maintenance management, path management, security management, system management and report management. It supports such services as TDM, ATM, Ethernet, PTN, WDM and intelligent services. While assuring transport equipment functions, it can manage and control NE and regional networks.

The system adopts multiple network management technologies, complies with ITU-T TMN ideas, collects the industry-leading NM software development experience and provides powerful management functions and flexible networking

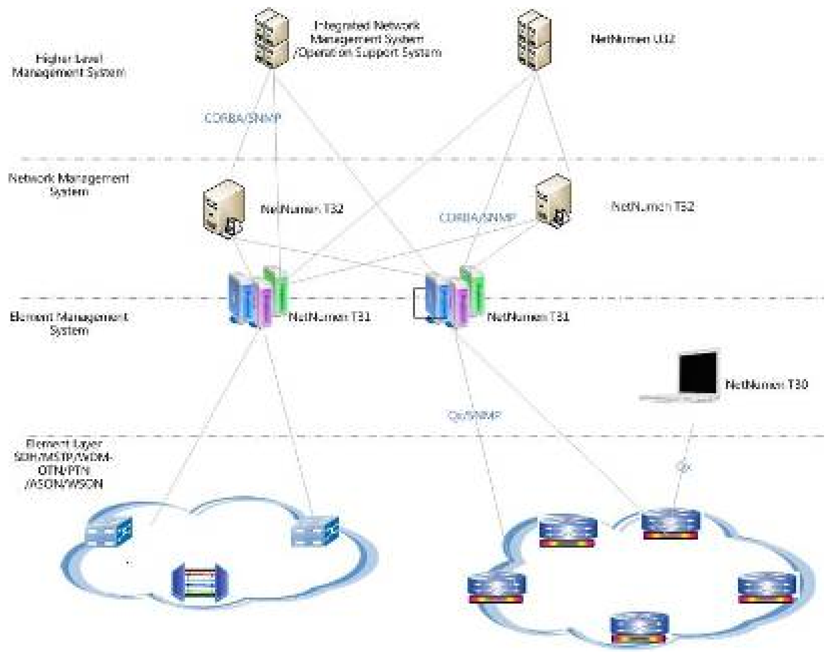

Figure 5 *Netnumen T31 network management hierarchy*

NM-side CORBA interface: Public interface among T31, T32 and third-party NM.

NM-side SNMP interface: Public interface among T31, T32 and third-party NM.

NM-side FTP and file interface: Public interface among T31, T32 and third-party NM.

Equipment-side SNMP interface: Public interface between NE and third-party NM and the interface between PTN equipment and NetNumen T31.

Equipment-side CLI interface: The interface between PTN equipment and NetNumen T31.

Equipment-side Syslog interface: The interface between PTN equipment and NetNumen T31.

F interface: It is located between Client and Manager and it is the private interface. It adopts the Ethernet mode (emulated in one computer) and TCP/IP.

Qx interface: It is located between SDH/MSTP/WDM-OTN equipment and NetNumen T31, and it is the private interface. It adopts the Ethernet mode and TCP/IP

The functions of Netnumen T31 NMS include:

- System management
- Configuration management
- End-to-end service management
- View management

- Fault management
- Security management
- Performance management
- SDH maintenance and management
- Report management

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3 EQUIPMENT LIST AND DIMENSIONING

3.1 Dimension of the network equipment

Table 7 Equipment list and dimensioning

3.2 System interface of ZXMP S385

Unit Name	Port Density (Interfaces/card)	Maximum Accessibility per Sub-rack
STM-64	1	14
STM-16	1/4	14/56
STM-4	2/4	56
STM-1	4/8	112
STM-1e	4/8	64
E3	6	48
T3	6	48
E1	63	630
T1	63	630
GE	2	28
SEC	8FE+GE	64FE+8GE
RPR	8FE+2GE	64FE+16GE
MPLS	8FE+2GE	64FE+16GE
ATM 155M	8	112
SAN	(4SAN+4GE) or 8GE	(56SAN+56GE) or 112GE

4 FUNCTIONAL CHARACTERISTICS OF SUPPLIER PRODUCT

4.1 Features of ZXWM M920

Figure 6 *Photo of ZXWM M920*

Large Capacity and Easy Upgrade

ZXWM M920 can provide 1920/3840 Gbit/s transmission capacity, fully satisfying the ever-growing requirements on bandwidth. The system is designed with modular structure and multi-rack management technology. It can be smoothly upgraded to 192-wavelength. Its good scalability and expansibility can protect user's investment maximally

Single 40Gbit/s system

ZXWM M920 can supports single 40Gbit/s system, and has following features:

- Support 96 wavelengths

Support 80/96*40G transmission and the capacity of at most 3.84T;

- P-DPSK and RZ-DQPSK modulation for ULH transmission

Improved DPSK coding has good OSNR tolerance and can restrain the non-linear effect well. It can reach 1500KM without the REG with 50GHZ spacing.

RZ-DQPSK coding has good PMD tolerance and can restrain the non-linear effect well. It can reach 2000KM without the REG with 50GHZ spacing.

- Embedded TODC and EDFA and the same dispersion tolerance & power budget as 10G system.

OTU board is embedded with TODC and EDFA, the system allows the biggest dispersion tolerance of -700ps/nm ~+700ps/nm, and the dispersion tolerance & power budget are the same as 10G system.

- Ultra high integration

40G board only needs 2 slots, with high integration and low power consumption. Single rack supports 21×40G wavelengths.

- Smooth network upgrade

The 40G board can plug and play in the legacy equipment because the system is developed on the existing WDM platform. It supports smooth upgrade from 10G to 40G without any service interruption

Super-long-haul Transmissio

With different optical transponder units (OTU), EDFA, FEC and AFEC technologies, RZ coding technology, P-DPSK coding technology, distributed Raman amplifier and dispersion management technology, ZXWM M920 can perform super long non-electric relay transmission from several kilometers up to thousands of kilometers

Multi-service Access Mode

ZXWM M920 adopts an open design. The accessed optical signals can be converted to ITU-T G.692 recommendation compliant wavelength signals for output by employing optical/electric/optical conversion technology.

It supports transparent transmission of optical signals in multiple formats, such as STM-N (N=1, 4, 16, 64,256), POS, GbE/10GE, ATM, ESCON, FICON and FC, which protect users' benefit and provide an ideal means for network expansion.

ZXWM M920 also can multiplex low-rate services into 40G、10G or 2.5G rates transparently to improve the availability of system wavelength

Flexible networking modes

Functionality of ZXWM M920 can be changed from OLA to OADM to OTM by choosing different combination of functional modules, making it more flexible for complicated network topologies, such as chain, star, cross, tangent-ring and mesh networks

Wavelength Add/Drop Functions

Filters in the ZXWM M920 can be configured flexibly to implement the adding/dropping of 1 to 80 wavelengths. With this kind of design, the ZXWM M920 supports both the FOADM and the ROADM functions.

FOADM: This function is to implement the adding/dropping of fixed wavelengths.

ROADM: With this function, wavelengths to be added/dropped can be reconfigured. Besides, add/drop ports can be assigned to these wavelengths flexibly, that is, the port assignment function. ZXWM M920 support ROADM function based on WB, PLC and WSS technologies

Reliable Protection Functions

ZXWM M920 can provide multiple and effective protection modes: Optical subnet connection protective switchover (OSNCP); Unidirectional optical line protective switchover (ULSR); Unidirectional optical channel protective switchover (UPSR); Bidirectional optical line share protective switchover (BLSR); Bidirectional optical channel share protective switchover (BPSR); 1: N tributary protection etc. which with the switching time shorter than 50 ms. When ZXWM M920 is configured as OADM node on a ring network, route protection of channels can be accomplished

Performance Monitoring Technologies

ZXWM M920 uses a board performance monitoring unit to capture board performance data, which can be viewed to accurately locate a fault via NMS

4.2 Features of ZXMP S385

Figure 7 *Photo of ZXMP S385*

ZXMP S385 is the intelligent optical transmission platform newly released by SUPPLIER. ZXMP

S385 targets the backbone or large capacity convergent layer of network and satisfies present and future requirements of networks. ZXMP S385 provides rich service access functions and complete protection mechanism, facilitating its wide applications. ZXMP S385 adopts modular design, incorporating SDH, Ethernet, ATM, PDH, and other technologies. It can transmit voice and data services efficiently on the same platform.

Cross-connection and extension capabilities: CSA board implements high-order and low-order cross-switching functions of ZXMP S385 (V1.10). CSA has a space-division switching capacity of 256 × 256 VC4. in which, 224 × 224 VC4s are allocated to the space-division cross-connect unit of the system, and the other 32 × 32 VC4s are assigned to the time-division cross-connect service unit. The current cross-connect unit completes blockless switching of 2016 × 2016 VC12.

Powerful Service Access Ability: ZXMP S385 adopts modular structure, with its hardware including cross-connect card, clock card, control card, service card and service interface card. The service access capacity is shown in following table. A single sub-rack of ZXMP S385 has 14 slots for service boards and 15 slots for interface boards. The equipment can access a large amount of PDH, SDH and data services at one time.

Complete Equipment Protection Ability: Supports 1:N (N≤9) protection of all electrical boards.

Perfect Network Protection Ability: In terms of the network level protection, ZXMP S385 supports multiplex section protection (MSP) ring, linear MSP, unidirectional path switched ring(UPSR) and subnet connection protection (SNCP). ZXMP S385 can implement all networking features recommended by ITU-T. It supports the route reconstruction of Ethernet and IP, and meets IEEE802.3E.

Reliable Timing Synchronization Processing: The clock timing/synchronization unit is composed of Cross Clock board (CSA) and SCI board. The unit completes system timing and network synchronization. A software-controlled or a hardware phase lock circuit is used to implement four working modes: a. Fast pull-in; b. Locked; c. Holdover; d. Free run.

Easy For Maintenance And Upgrade

Perfect EMC and Operation Safety: EMC, operation safety and fire/explosion protection of the equipment are fully considered in the circuit board design.

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