

MUKHTAR & DOSSARY GROUP – General Service Rate

Dear Valued Customer,

Thank you for considering our service. We are one of the Largest Network Providers Companies in the area.

At your request, we submit you our General Service Rate showing current adjustments.

According to your initial budget, we will provide you with quality products, impeccable and efficient service that will meet your requirements. Our full service is guaranteed to integrate your corporate. Using our network, you will be able to transfer a full-length movie between two sites in an average of 10-20 minutes. In order for us to design you the network to connect your branches together, we will use both hardware and phone company's services.

The estimated total cost is:

1,433,132.53 S.R.

This cost based on our engineers view. This deal includes some offers:

- Free Internet connectivity for 1 year
- 6 months free connections
- 6 months free helpdesk and maintenance

We also want to make sure that you understand how is our business going. For your convenient, our deal includes some free deals. In the other hand, you will need to start paying the connection fees in order to have to connection running. It will cost you **940,608 S.R.** per year. Also, the Internet connectivity will cost **146,250 S.R.** We are proud of our reputation for putting the needs and wants of our customer first.

Finally, we have some other proposed services that might integrate your network. These are listed below:

- We can provide you all the links needed to connect your branches together thru us.
- We also provide Back-up service to store your data at our side. This will guarantee that the data will be saved and totally secured.
- Powerful IBM Servers.
- We provide a service called Dial Backup. By this service, a branch always able to talk to other branches even if the link goes down for some time.

Your feedback and comments will encourage us and will enable us to serve your needs better. Thank you for your trust in the integrity and impartiality of us.

Sincerely,

Abdullah Mukhtar & Khalid Al-Dossary Group

Khobar Corporate Project

Dear Networking Manager,

Following up with the project, which you have assigned to us regarding the corporate that wants to connect its branches together, we have made our design for the LAN/WAN (Local Area & Wide Area) networks. This report will show our point of view as engineers for designing such networks, financial statements, justifications, proposed ideas, hardware used and limitations for our design.

As we have understood that the corporate runs multimedia and movies, and has 3 main branches located at Riyadh, Jeddah and Khobar. The headquarter branch is the one in Khobar. This corporate, however, wants to setup its WAN in order to serve the different branches. It has 10 new branches that want to be connected too.

Since video transferring over networks needs to have high bandwidth, we decided to use full channel T1 Frame Relay to transfer video over WAN. Moreover, dedicated full T1 lines are used too. DIGEX, the Local Loop Provider, will provide us with the T1 lines and the Frame Relay circuits in order to connect our new client. Also, we will use 100 Fast Ethernet as LAN in each branch of our client.

We will provide the customer with the hardware such as routers, switches and cables. Our engineers and technicians will take care the hardware installations and configurations while DIGEX will install all local loops links. DIGEX people are waiting for us to set up an installation date in each branch so that they can go and finish all links required such as telephone jacks.

When estimating the total cost, we calculated the installation charges and how we would pay our engineers and technicians until they finish up their work. Since traveling would be required, from Madinah to each branch, we estimated the lodging costs, food and transportations. To complete the installations, we need 4 guys in Khobar site, 7 in Jeddah and other 7 in Riyadh sites. It will take them 5 days to complete everything and make sure that everything will be working as we have planned.

Our design will meet the customer requirements and hopefully, it will be approved from your side.

Everything is documented and attached to this letter so that you will have an idea about how and why we did choose this design.

Sincerely,

Abdullah Mukhtar & Khalid Al-Dossari Group.

Justification:

For the WAN design, we will be using Frame Relay Service to connect the main 3 branches, Riyadh, Jeddah and Khobar, using the circuit provided by the phone company.

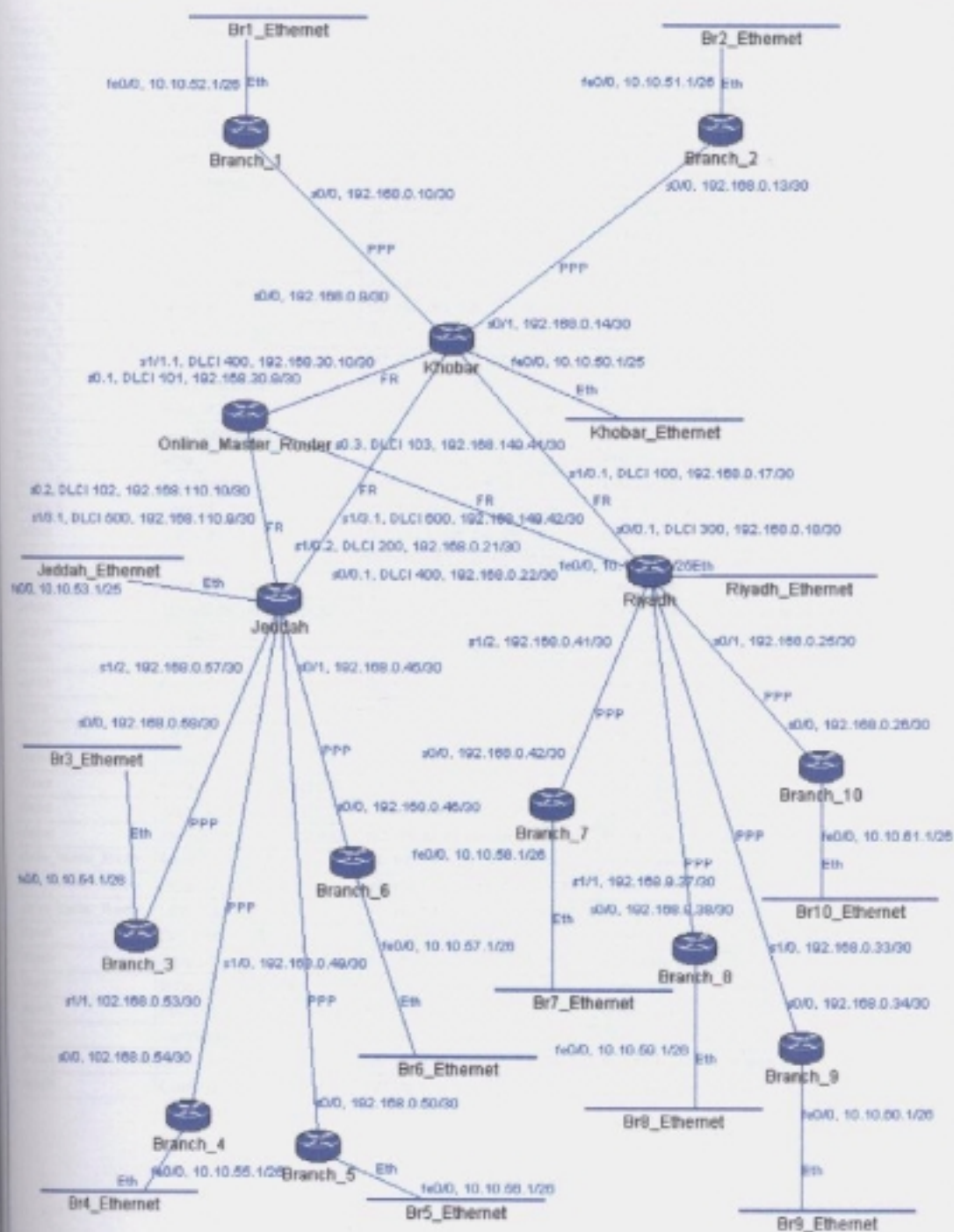
Frame relay is considered as a layer2 (Data Link) application. It encapsulates the data in a frame relay packet. Frame relay takes both IP and data and reformatted them to travel over frame relay cloud. If the data arrives to the other side of the cloud, it will be reformatted again to its original format and will be delivered to layer3 (network layer).

When ordering a frame relay circuit from the telephone company, they will ask us two major questions that are "What is the DLCI (Data Link Connection Identifier) of the master router?" and "what are the DLCIs you want for the clients". Since DLCIs should be unique within a cloud, you cannot re-use them in one cloud. In frame relay two VCs, virtual circuits, are found. One VC is related to the control information, so that packets will not contain anything but data. In the other hand, the other VC is dedicated for data only. So this will transfer the data transferred with the highest transfer rate.

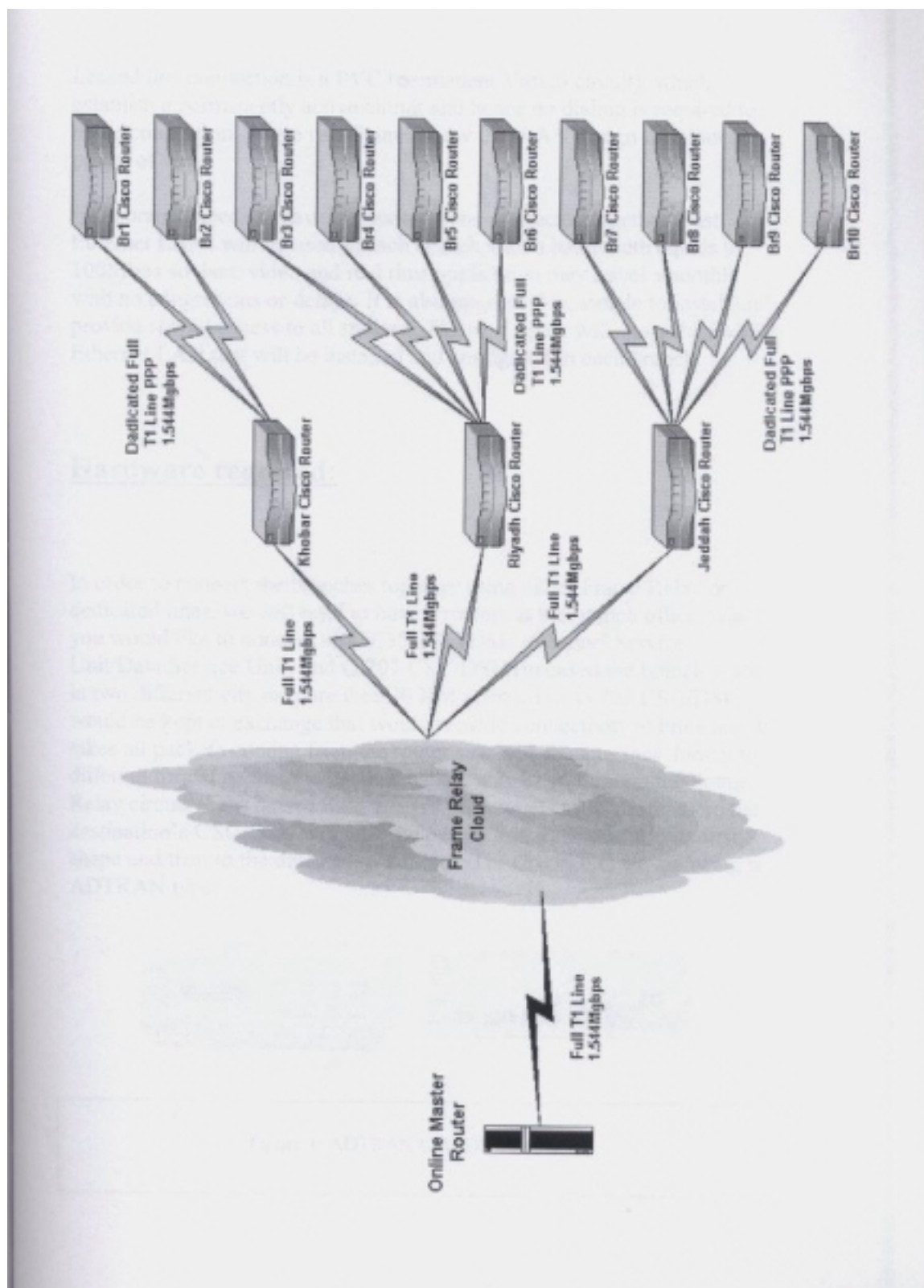
Frame Relay is a shared access for everyone attached to the circuit but still the we can run video or real time applications on it, since we will be using full T1 line, not fractional one, with bandwidth reaches up to 1.532Mbps. It is cheaper than having full T1 dedicated leased line in all branches.

In the other hand, as a full T1 customer, you always have the full bandwidth available to you over an unshared, non-fractional 1.544 Mbps leased line. A T1 line is consist of 24 channels each of 56K or 64K. Since the corporate is running a high-traffic data and has lot of active workstation to connect, a full T1 will be needed to ensure quick response times for the users.

If a movie size is 1.2Gbyte in average, T1 Frame Relay will transfer the movie between sites in an average of 10-20 minutes using 1.544Mbps.



Device	Interface	IP	Type	Connected To
Branch_1	Fast Ethernet 0/0	10.10.52.1, 255.255.255.192	Ethernet	Br1_Ethernet
Branch_1	Serial 0/0	192.168.0.10, 255.255.255.252	PPP (Sync Serial)	Khobar
Branch_10	Fast Ethernet 0/0	10.10.61.1, 255.255.255.192	Ethernet	Br10_Ethernet
Branch_10	Serial 0/0	192.168.0.26, 255.255.255.252	PPP (Sync Serial)	Riyadh
Branch_2	Fast Ethernet 0/0	10.10.51.1, 255.255.255.192	Ethernet	Br2_Ethernet
Branch_2	Serial 0/0	192.168.0.13, 255.255.255.252	PPP (Sync Serial)	Khobar
Branch_3	Fast Ethernet 0/0	10.10.54.1, 255.255.255.192	Ethernet	Br3_Ethernet
Branch_3	Serial 0/0	192.168.0.58, 255.255.255.252	PPP (Sync Serial)	Jeddah
Branch_4	Fast Ethernet 0/0	10.10.55.1, 255.255.255.192	Ethernet	Br4_Ethernet
Branch_4	Serial 0/0	192.168.0.54, 255.255.255.252	PPP (Sync Serial)	Jeddah
Branch_5	Fast Ethernet 0/0	10.10.56.1, 255.255.255.192	Ethernet	Br5_Ethernet
Branch_5	Serial 0/0	192.168.0.50, 255.255.255.252	PPP (Sync Serial)	Jeddah
Branch_6	Fast Ethernet 0/0	10.10.57.1, 255.255.255.192	Ethernet	Br6_Ethernet
Branch_6	Serial 0/0	192.168.0.48, 255.255.255.252	PPP (Sync Serial)	Jeddah
Branch_7	Fast Ethernet 0/0	10.10.58.1, 255.255.255.192	Ethernet	Br7_Ethernet
Branch_7	Serial 0/0	192.168.0.42, 255.255.255.252	PPP (Sync Serial)	Riyadh
Branch_8	Fast Ethernet 0/0	10.10.59.1, 255.255.255.192	Ethernet	Br8_Ethernet
Branch_8	Serial 0/0	192.168.0.36, 255.255.255.252	PPP (Sync Serial)	Riyadh
Branch_9	Fast Ethernet 0/0	10.10.60.1, 255.255.255.192	Ethernet	Br9_Ethernet
Branch_9	Serial 0/0	192.168.0.34, 255.255.255.252	PPP (Sync Serial)	Riyadh
Jeddah	Fast Ethernet 0/0	10.10.53.1, 255.255.255.128	Ethernet	Jeddah_Ethernet
Jeddah	Serial 0/1	192.168.0.45, 255.255.255.252	PPP (Sync Serial)	Branch_6
Jeddah	Serial 0/0.1, DLCI 400	192.168.0.22, 255.255.255.252	Frame Relay	Khobar
Jeddah	Async/Sync 1/0.1, DLCI 500	192.168.110.9, 255.255.255.252	Frame Relay	Online_Master_Router
Jeddah	Async/Sync 1/0	192.168.0.46, 255.255.255.252	PPP (Sync Serial)	Branch_5
Jeddah	Async/Sync 1/1	192.168.0.53, 255.255.255.252	PPP (Sync Serial)	Branch_4
Jeddah	Async/Sync 1/2	192.168.0.57, 255.255.255.252	PPP (Sync Serial)	Branch_3
Khobar	Fast Ethernet 0/0	10.10.50.1, 255.255.255.128	Ethernet	Khobar_Ethernet
Khobar	Serial 0/0	192.168.0.8, 255.255.255.252	PPP (Sync Serial)	Branch_1
Khobar	Serial 0/1	192.168.0.14, 255.255.255.252	PPP (Sync Serial)	Branch_2
Khobar	Async/Sync 1/0.1, DLCI 100	192.168.0.17, 255.255.255.252	Frame Relay	Riyadh
Khobar	Async/Sync 1/0.2, DLCI 200	192.168.0.21, 255.255.255.252	Frame Relay	Jeddah
Khobar	Async/Sync 1/1.1, DLCI 400	192.168.30.10, 255.255.255.252	Frame Relay	Online_Master_Router
Online_Master_Router	Serial 0.1, DLCI 101	192.168.30.9, 255.255.255.252	Frame Relay	Khobar
Online_Master_Router	Serial 0.2, DLCI 102	192.168.110.10, 255.255.255.252	Frame Relay	Jeddah
Online_Master_Router	Serial 0.3, DLCI 103	192.168.149.41, 255.255.255.252	Frame Relay	Riyadh
Riyadh	Fast Ethernet 0/0	10.10.62.1, 255.255.255.128	Ethernet	Riyadh_Ethernet
Riyadh	Serial 0/1	192.168.0.25, 255.255.255.252	PPP (Sync Serial)	Branch_10
Riyadh	Serial 0/0.1, DLCI 300	192.168.0.18, 255.255.255.252	Frame Relay	Khobar
Riyadh	Async/Sync 1/0.1, DLCI 600	192.168.149.42, 255.255.255.252	Frame Relay	Online_Master_Router
Riyadh	Async/Sync 1/0	192.168.0.30, 255.255.255.252	PPP (Sync Serial)	Branch_9
Riyadh	Async/Sync 1/1	192.168.0.37, 255.255.255.252	PPP (Sync Serial)	Branch_8
Riyadh	Async/Sync 1/2	192.168.0.41, 255.255.255.252	PPP (Sync Serial)	Branch_7



Leased line connection is a PVC (permanent Virtual circuit), which establish a permanently active circuit and hence no dialing is required to make connection. These two figures show the WAN design from our points of view.

Each branch needs to have its workstations connected together. Fast Ethernet LANs will be used in each branch with a bandwidth equals to 100Mbps so data, video and real time application may travel smoothly with no congestions or delays. It is also upgradeable, simple to install and provide shared access to all stations. The next figure will show the Fast Ethernet LAN that will be installed and configured in each branch.

Hardware required:

In order to connect the branches together using either Frame Relay or dedicated lines, we will need to have a routers at the branch office, which you would like to connect and V.35 CSU/DSU (Channel Service Unit/Data Service Unit) and G.703 CSU/DSU (in cased the branches are in two different city or more then 20 KM apart). The G.703 CSU/DSU would be kept at exchange that would provide connectivity at branches. It takes all packets coming from the router side and changes their format to different format so that the packets will be able to go through the Frame Relay circuit or the leased line. When a packet gets to its destination, the destination's CSU/DSU will take the packet and re-format it to its first shape and then to the destination's router. The CSU/DSU we are using is ADTRAN type.



Figure 1: ADTRAN CSU/DS T1 Channel