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CARIBBEAN DEVELOPMENT AND CO-OPERATION COMMITTEE

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND
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CARSTIN Training Workshop/Seminar on
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TELECOMMUNICATION SERVICES IN TRINIDAD AND TOBAGO:

DESCRIPTION OF THE LOCAL DATA NETWORK



UNITED NATIONS

ECONOMIC COMMISSION FOR LATIN AMERICA Office for the Caribbean

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1.0. GENERAL:

TELECOMMUNICATIONS SERVICES FOR TRINIDAD & TOBAGO ARE DISTINGUISHED AS BEING LOCAL OR INTERNATIONAL. LOCAL TELECOMMUNICATIONS SERVICES ARE PROVIDED BY THE TRINIDAD AND TOBAGO TELEPHONE COMPANY, A 100% GOVERNMENT OWNED COMPANY. INTERNATIONAL OR EXTERNAL TELECOMMUNICATION SERVICES ARE PROVIDED BY THE TRINIDAD EXTERNAL TELECOMMUNICATIONS COMPANY A 51% GOVERNMENT OWNED COMPANY.

SUPPLY OF TELEPHONE TERMINAL EQUIPMENT IN THE FORM OF PBX'S AND KEY SYSTEMS IS ^{Restricted} DEMONOPOLISED, ENABLING THE SO CALLED INTER-CONNECT COMPANIES TO SUPPLY AND MAINTAIN AUTHORISED TERMINAL EQUIPMENT.

THE TELEPHONE COMPANY IS MONITORED BY THE PUBLIC UTILITIES CORPORATION, TO ENSURE THE FAIRNESS OF THE SERVICES, RATES AND CHARGES.



2.0. SUMMARY OF SERVICES PROVIDED:

- LOCAL SWITCHED TELEPHONE SERVICE.
- OVERSEAS CARRIER ACCESS FOR INTERNATIONAL TELEPHONE SERVICE.
- BILLING AND COLLECTION FOR INTERNATIONAL CHARGES, IN ADDITION TO LOCAL CHARGES.
- SUPPLY AND MAINTENANCE OF CUSTOMER OWNED OR RENTED TERMINAL EQUIPMENT.
- PROVISION OF LEASED LINE SERVICE BETWEEN LOCATIONS IN TRINIDAD AND TOBAGO FOR VOICE AND/OR DATA CUSTOMER REQUIREMENTS.
- PROVISION OF LOCAL SWITCHED DATA NETWORK (DATANETT, TELEX).
- OVERSEAS CARRIER ACCESS FOR FOREIGN SWITCHED DATA NETWORK ACCESS. (TELENET, TELEX).
- SUPPLY AND MAINTENANCE OF DATA COMMUNICATING EQUIPMENT. (MODEMS AND TELEX MACHINES).
- SUPPLY AND MAINTENANCE OF DATA TERMINATING EQUIPMENT. (TELEX MACHINES).



2.0. SUMMARY OF SERVICES PROVIDED (CONT'D).

- CONSULTANCY SERVICES FOR:
 - PRIVATE VOICE AND/OR DATA NETWORKS.
 - BUILDING INDUSTRY TELECOMMUNICATIONS PROVISIONING REQUIREMENTS.



3.0. EQUIPMENT AND PLANT:

THE EQUIPMENT & PLANT OWNED BY THE TELEPHONE COMPANY
IS CONSERVATIVELY VALUED AT AND
IS COMPOSED OF THE FOLLOWING:

SWITCHING FACILITIES

TELEPHONE SWITCHES
TELEX SWITCH
PACKET SWITCH

TRANSMISSION FACILITIES

SUBSCRIBER LOOP CABLE
INTEROFFICE CABLE
MICROWAVE RADIO - DIGITAL & ANALOG
FIBRE OPTIC CABLES

TERMINAL EQUIPMENT

TELEPHONES
PBX'S
KEY SETS
TELEX MACHINES
FACSIMILE
INTEGRATED TERMINALS



4.0. SWITCHED NETWORKS

COMMUNICATIONS NETWORKS ARE NEEDED TO PROVIDE COMMUNICATION SERVICES TO:

- REDUCE COMMUNICATION COSTS.
- IMPROVE ORGANISATIONAL EFFICIENCY.
- DECENTRALISE OPERATIONS.

IT IS NOT ECONOMICALLY OR TECHNICALLY FEASIBLE TO PROVIDE DEDICATED LINKS IN THE NETWORK BETWEEN ALL CUSTOMERS, THEREFORE, IT IS NECESSARY TO PROVIDE SWITCHED NETWORKS.

THERE ARE TWO FUNDAMENTAL TYPES OF SWITCHED NETWORKS.

- MESSAGE SWITCHING NETWORKS.
- CIRCUIT SWITCHING NETWORKS.

IN A MESSAGE SWITCHING NETWORK, THE ENTIRE COMMUNICATION BANDWIDTH IS DEDICATED TO THE MESSAGE. DIFFERENT MESSAGES ARE INTERLEAVED IN TIME.

IN A CIRCUIT SWITCHING NETWORK PART OF THE COMMUNICATION BANDWIDTH IS DEDICATED TO THE INFORMATION INTERCHANGE. SIMULTANEOUS INTERCHANGES SHARE THE COMMUNICATION BANDWIDTH.



4.0. SWITCHED NETWORKS (CONT'D).

DATANETT IS A TYPE OF MESSAGE SWITCHING NETWORK.
CALLED A PACKET SWITCHING NETWORK.

THE TELEPHONE AND TELEX NETWORKS ARE CIRCUIT SWITCHING
NETWORKS.

PACKET SWITCHED NETWORK.

SEE ATTACHED DIAGRAM "EXHIBIT 1".



5.0 DATANETT CONFIGURATION

A TYPICAL PACKET SWITCHED NETWORK IS SHOWN IN EXHIBIT A.

THE PADs (PACKET ASSEMBLERS/DISASSEMBLERS) BREAKS THE MESSAGES INTO PACKETS AND RECONSTRUCTS THEM.

THE PACKETS ARE ROUTED WITHIN THE NETWORK AS REQUIRED.

PAD'S ARE SOMETIMES CALLED CONCENTRATORS.

THE LOCAL DATE NETWORK DATANETT IS CONFIGURED AS .IN THE ATTACHED DIAGRAM - EXHIBIT 2.



6.0. TELCO DATA COMMUNICATION SERVICES

THE TRINIDAD & TOBAGO TELEPHONE COMPANY, IS A STATE CORPORATION WITH A MANDATE TO PROVIDE TELECOMMUNICATION FACILITIES AND SERVICES.

6.1. CARRIER FACILITIES

APART FROM THE PROVISION OF TELEPHONE SERVICES, THE TELEPHONE COMPANY PROVIDES CARRIER FACILITIES TO ALLOW DATA COMMUNICATION FOR THE GENERAL PUBLIC. THERE ARE MANY DIFFERENT FACILITIES AVAILABLE. THESE CAN BE SUBDIVIDED INTO TWO (2) BASIC CATEGORIES, NAMELY LEASED LINES AND DATANETT ACCESS.

LEASED LINES ARE AVAILABLE ON REQUEST FROM THE TELEPHONE COMPANY. IN GENERAL, A LEASED LINE WILL UTILISE THE TELEPHONE COMPANY'S OUTSIDE PLANT FACILITIES TO PROVIDE TWO (2) PAIRS OF METALLIC CABLES BETWEEN LOCATIONS WHICH ARE PHYSICALLY SOME DISTANCE APART. IF MICROWAVE RADIO LINKS ARE INCLUDED, THE BANDWIDTH IS STRICTLY BAND LIMITED TO 4 KHZ.

THESE LINES MAY BE SET UP IN A POINT TO POINT TO MULTIPOINT CONFIGURATION. IN THE MULTIPPOINT CONFIGURATION THE TELEPHONE COMPANY PROVIDES THE VOICE FREQUENCY BRIDGE WHICH PHYSICALLY CONNECTS THE DIFFERENT LINKS.

THE COMMUNICATION PROTOCOL AND TRANSMISSION SPEED ARE CUSTOMER DETERMINED.



THE COST OF THIS SERVICE IS AS FOLLOWS:

<u>LEASED CIRCUIT SERVICE (PRIVATE LINES)</u>	<u>MTHLY RATES</u>
BETWEEN TWO POINTS IN THE SAME BUILDING	\$20.00
BETWEEN TWO POINTS ON THE SAME COMPOUND	\$30.00
BETWEEN TWO POINTS - CONNECTED TO THE SAME LOCAL EXCHANGE. THE CHARGE IS (A) LOCAL LINE RENTAL AT EACH END	\$100.00
BETWEEN TWO POINTS CONNECTED TO DIFFERENT LOCAL EXCHANGES. THE CHARGE WILL CONSIST OF: (A) LOCAL LINE RENTAL AT EACH END	\$100.00
(B) A DISTANCE CHARGE PER AIR LINE KILOMETER, OR PART THEREOF BETWEEN EXCHANGES	\$35.00
LEASED CIRCUIT TO EXTERNAL COMMUNICATION CARRIER. THE CHARGE WILL CONSIST OF: (A) AN ACCESS CHARGE	\$500.00
(B) LOCAL LINE RENTAL	\$100.00
(C) A DISTANCE CHARGE PER AIRLINE KILOMETER OR PART THEREOF BETWEEN EXCHANGES	\$35.00
END INSTALLATION CHARGE FOR EACH SITE	\$90.00

(THESE CHARGES DO NOT INCLUDE ANY CHARGES FOR MODEMS).



CHARACTERISTICS OF TELCO DATANETT

- PACKET SWITCHING TECHNOLOGY
- SUPPORTS WIDE RANGE OF PROTOCOLS AND PORT SPEEDS
- AUTOCONNECT FEATURE
- PRIVATE NETWORK FEATURE
- ROTARY FEATURE
- SUPPORTS MULTIDROP CONFIGURATIONS
- PROVIDES ACCESS TO OTHER PDN'S
- PROVIDES ACCESS TO INTERNATIONAL DATA BASES



6.2. PACKET SWITCHED NETWORK SERVICE (DATANETT)

GENERAL:

TRINIDAD AND TOBAGO TELEPHONE COMPANY PUBLIC DATA COMMUNICATION SERVICE, ENABLES CUSTOMER STATIONS TO COMMUNICATE WITH STATIONS IN TRINIDAD AND TOBAGO AS WELL AS TO PROVIDE INTERNATIONAL CONNECTION TO STATIONS OUTSIDE TRINIDAD AND TOBAGO.

THE NETWORK OPERATES BY SEGMENTING CUSTOMER DATA INTO SMALL BLOCKS CALLED PACKETS, AND BY STORING AND FORWARDING THE PACKETS THROUGH THE NETWORK. ALL PACKETS ARE CHECKED FOR TRANSMISSION ERRORS AND AUTOMATICALLY RETRANSMITTED IF NECESSARY. BEFORE DELIVERY TO THE DESTINATION STATION, THE CUSTOMER DATA CARRIED IN PACKETS, IS REASSEMBLED INTO THE PROPER SEQUENCE AND FORM.

LINES:

THE TELEPHONE COMPANY SHALL PROVIDE, INSTALL AND MAINTAIN ALL TELEPHONE LINES FROM THE CENTRAL OFFICE TO THE CUSTOMER PREMISES. THESE LINES SHALL BE FULL DUPLEX OR HALF DUPLEX ACCORDING TO CUSTOMER REQUIREMENTS.

MODEMS:

ALL MODEMS REQUIRED FOR DEDICATED CONNECTION TO THE NETWORK SHALL BE PROVIDED, INSTALLED AND MAINTAINED BY THE TELEPHONE COMPANY.



PROTOCOLS:

THE TRINIDAD AND TOBAGO DATA COMMUNICATIONS SERVICES SHALL SUPPORT THE FOLLOWING PROTOCOLS ON THE PUBLIC DATA NETWORK.

- (1) ASYNCHRONOUS (START/STOP)
CCITT RECOMMENDATIONS X.28, X.3, X.29 WILL BE SUPPORTED.
- (2) BINARY SYNCHRONOUS COMMUNICATIONS:
-X780, 3270/BSE.
- (3) SYNCHRONOUS DATA LINK CONTROL (SDLC) IN THE TWO-WAY ALTERNATE MODE. A VIRTUAL CONNECTION WILL BE ESTABLISHED FOR EACH COMMUNICATION CONTROLLER VIA AUTO-CONNECT MECHANISM ONLY.
- (4) * CCITT X.25 (EX-TWENTY FIVE).

PORT SPEEDS:

THE FOLLOWING TABLE SUMMARIZES THE SPEED AT WHICH EACH TYPE OF PORT MAY OPERATE.

<u>TRANSMISSION SPEED (BPS)</u>	<u>MODE</u>
300-1200 (BPS)	ASYNCHRONOUS
1200	SYNCHRONOUS
2400	"
* 4800	"
* 9600	"



INTERFACE-BETWEEN CUSTOMER STATION AND NETWORK:

THE ELECTRICAL CHARACTERISTICS OF THE INTERCHANGE CIRCUITS AT THE CUSTOMER STATION SIDE OF THE INTERFACE MUST COMPLY WITH THE CCITT RECOMMENDATION V.28 USING THE 25-PIN CONNECTOR AND PIN ALLOCATION STANDARDIZED BY ISO (DIS2110.2). THESE CIRCUIT FUNCTIONS MUST BE IN ACCORDANCE WITH THE CCITT RECOMMENDATION V.24. AN ALTERNATIVE TO COMPLY WITH RECOMMENDATIONS V.28 AND V.24 IS TO COMPLY WITH THE EIA RS-232-C STANDARD.

VIRTUAL CONNECTIONS:

CUSTOMER STATIONS COMMUNICATE WITH ONE ANOTHER BY ESTABLISHING UPON DEMAND, A "VIRTUAL CONNECTION". A VIRTUAL CONNECTION IS A LOGICAL ASSOCIATION OR LINK BETWEEN TWO STATIONS, AND MAY BE ESTABLISHED ON A TEMPORARY OR PERMANENT BASIS. ONCE A VIRTUAL CONNECTION IS ESTABLISHED DATA IS AUTOMATICALLY ROUTED BY THE NETWORK FROM THE STATION AT THE OTHER END.

* NOTE THESE SERVICES ARE PRESENTLY ONLY AVAILABLE TO CUSTOMERS CONNECTED TO THE PORT OF SPAIN DCO.

SINGLE-CONNECTION AND MULTIPLE-CONNECTION PORTS:

STATIONS MAY BE ATTACHED TO THE NETWORK THROUGH EITHER SINGLE OR MULTIPLE-CONNECTION PORTS. A STATION ATTACHED TO A SINGLE-CONNECTION PORT MAY COMMUNICATE OVER ONLY A SINGLE VIRTUAL CONNECTION AT ANY INSTANT OF TIME.



ONCE A VIRTUAL CONNECTION IS ESTABLISHED THROUGH A SINGLE-CONNECTION PORT, THE STATION ATTACHED TO SUCH PORT NEED NOT PROVIDE FUTURE ADDRESSING INFORMATION AS IT TRANSMITS DATA THROUGHOUT THE DURATION OF THE CONNECTION.

COMMUNICATION BETWEEN STATIONS:

STATIONS CONNECTED TO THE NETWORK MAY COMMUNICATE WITH OTHER COMPATIBLE STATIONS OPERATING AT THE SAME SPEED. IN ADDITION, STATIONS WHICH ARE INCOMPATIBLE WITH EACH OTHER AND/OR WHICH OPERATE AT DIFFERENT SPEEDS MAY COMMUNICATE THROUGH THE NETWORK AS DESCRIBED BELOW.

(A) ASYNCHRONOUS STATIONS:

ASYNCHRONOUS STATIONS MAY OPERATE IN "NETWORK VIRTUAL TERMINAL" (NVT) MODE, WHEREBY TWO DISSIMILAR STATIONS MAY COMMUNICATE WITH EACH OTHER, AND THE NETWORK WILL ACCOMMODATE DIFFERENCES IN DEVICE-DEPENDENT CHARACTERISTICS, INCLUDING CHARACTER CODES AND FORMATS, AND DEVICE TIMING. NVT SUPPORT IS LIMITED TO THOSE STATIONS WHICH THE TELEPHONE COMPANY DEEMS APPROPRIATE FOR OPERATION IN SUCH MODE WITH THE NETWORK.

ASYNCHRONOUS STATIONS MAY COMMUNICATE WITH OTHER ASYNCHRONOUS STATIONS OPERATING AT DIFFERENT SPEEDS PROVIDED THAT, IF TRANSMISSION IS FROM A HIGHER-SPEED TO A LOWER-SPEED STATION, THE NETWORK IS NOT REQUIRED TO STORE MORE THAN 500 CHARACTERS AT ANY TIME.



(B) SYNCHRONOUS STATIONS:

SYNCHRONOUS STATIONS CONNECTED TO SINGLE-CONNECTION PORTS MAY COMMUNICATE WITH OTHER SYNCHRONOUS STATIONS UTILIZING THE SAME TRANSMISSION PROTOCOL AND OPERATING AT THE SAME OR DIFFERENT SPEEDS. THE NETWORK SETS THE AVERAGE RATE OF DATA TRANSFER TO EQUAL THE RATE ACCEPTABLE TO THE RECEIVING STATION.

SYNCHRONOUS STATIONS CONNECTED TO MULTIPLE-CONNECTED PORTS MAY COMMUNICATE WITH SYNCHRONOUS AND ASYNCHRONOUS STATIONS OPERATING WITH ANY STANDARD NETWORK SPEED AND TRANSMISSION PROTOCOL IN EITHER TRANSPARENT OR NVT MODE.

6.3. SERVICE COMPONENTS

TRAFFIC:

CUSTOMER INFORMATION OR DATA TRANSMITTED FROM ONE STATION TO ANOTHER THROUGH THE NETWORK IS CONVERTED BY THE NETWORK FOR TRANSMISSION WITHIN THE NETWORK INTO ONE OR MORE PACKETS WHOSE MAXIMUM LENGTH IS 1,204 BITS OF DATA. DATA TRANSMITTED TO OR FROM CHARACTER-ORIENTED STATIONS IS CONVERTED BY THE NETWORK INTO PACKETS WHOSE MAXIMUM LENGTH IS 128 CHARACTERS. THE CUSTOMER OR AUTHORIZED USER MAY CONTROL HOW MANY BITS OR CHARACTERS EACH PACKET WILL CONTAIN WITHIN THESE LIMITS. CHARGES FOR EACH INFORMATION CARRYING PACKET ARE BILLED TO THE CUSTOMER RESPONSIBLE FOR THE VIRTUAL CONNECTION OVER WHICH THE PACKET IS SENT.



CHARACTERISTICS OF TELCO DATANETT

- ° PACKET SWITCHING TECHNOLOGY
- ° SUPPORTS WIDE RANGE OF PROTOCOLS AND PORT SPEEDS
- ° AUTOCONNECT FEATURE
- ° PRIVATE NETWORK FEATURE
- ° ROTARY FEATURE
- ° SUPPORTS MULTIDROP CONFIGURATIONS
- ° PROVIDES ACCESS TO OTHER PDN'S
- ° PROVIDES ACCESS TO INTERNATIONAL DATA BASES



STATIONS MAY INSTRUCT THE NETWORK TO ESTABLISH AND TERMINATE VIRTUAL CONNECTIONS AND TO SET AND CHANGE PARAMETERS WHICH CONTROL THE OPERATION OF A PARTICULAR VIRTUAL CONNECTION. STATIONS CONNECTED TO THE NETWORK VIA MULTIPLE-CONNECTION PORTS MAY ALSO INQUIRE AS TO THE CURRENT VALUES OF SUCH PARAMETERS. EACH SUCH INSTRUCTION OR INQUIRY AND THE CORRESPONDING RESPONSE CONSTITUTE A PAIR OF PACKETS, THE CHARGE FOR WHICH IS BILLED TO THE CUSTOMER RESPONSIBLE FOR THE PARTICULAR VIRTUAL CONNECTION.

CUSTOMERS ARE NOT CHARGED FOR PACKETS GENERATED INTERNALLY BY THE NETWORK FOR THE ACKNOWLEDGEMENT OF TRAFFIC-CARRYING PACKETS, NOR ARE CUSTOMERS CHARGED FOR ANY PACKETS WHICH ARE RETRANSMITTED BY A NETWORK NODE UPON DETECTION OF A TRANSMISSION ERROR.

OPTIONAL SERVICE FEATURES

(A) AUTOCONNECT FEATURES:

THE AUTOCONNECT FEATURE ALLOWS USERS TO BYPASS THE NORMAL NETWORK SIGN ON PROCEDURE AND RECEIVE AN AUTOMATIC CONNECTION TO A HOST SYSTEM NETWORK ADDRESS. THIS TIMESAVING FEATURE IS PARTICULARLY USEFUL WHEN A USER INITIATES A NUMBER OF CONNECTIONS TO THE SAME HOST THROUGHOUT THE DAY.



(B) PRIVATE NETWORK FEATURE:

ACCESS PORTS MAY BE EQUIPPED WITH THE PRIVATE NETWORK FEATURE (PNF). ACCESS PORTS OPERATING UNDER PNF CONTROL ARE PERMITTED TO ESTABLISH OR ACCEPT VIRTUAL CONNECTIONS TO OR FROM ONLY THOSE DISTANT STATIONS SPECIFIED BY THE CUSTOMER. ATTEMPTS TO ESTABLISH VIRTUAL CONNECTION TO OR FROM ANY OTHER STATIONS WILL BE REJECTED BY THE NETWORK. A PRIVATE NETWORK LIST MUST BE ESTABLISHED BY THE CUSTOMER FOR EACH ACCESS PORT FOR WHICH THE PRIVATE NETWORK FEATURE IS REQUESTED.

(c) ROTARY FEATURE:

THE ROTARY FEATURE ENABLES USERS TO ACCESS ANY OF A GROUP OF SIMILAR SUBSCRIBER PORTS (TYPICALLY AT A DESTINATION HOST COMPUTER) THROUGH A SINGLE NETWORK ADDRESS. THE CUSTOMER MUST SPECIFY WHICH PORTS ARE TO OPERATE UNDER ROTARY CONTROL. A VIRTUAL CONNECTION INITIATED BY A DISTANT STATION TO THE GROUP IS ESTABLISHED TO THE FIRST AVAILABLE PORT ON THE LIST. THE CUSTOMER MUST SPECIFY THE ORDER IN WHICH THE PORTS ARE TO BE SELECTED.

(c) MULTIDROP CONFIGURATION:

IF THE TRANSMISSION PROTOCOL BEING USED IS EITHER BSC 3270 OR SDLC THEN THE CUSTOMER MAY CONFIGURE HIS COMMUNICATIONS CHANNEL TO BE A MULTIDROP CHANNEL. THIS IS A CONFIGURATION IN WHICH SEVERAL STATIONS SHARE THE SAME ACCESS LINE TO THE CENTRAL OFFICE

AND THE SAME PORT AT THE CENTRAL OFFICE. EACH STATION, HOWEVER, MUST BE CONNECTED TO A DIFFERENT MODEM.

INTERNATIONAL CONNECTION

(A) ACCESS TO OTHER PUBLIC DATA NETWORKS:

THE TRINIDAD AND TOBAGO DATA COMMUNICATIONS SERVICE SHALL, VIA TEXTEL, PROVIDE ACCESS TO PUBLIC DATA NETWORKS IN OTHER COUNTRIES. A LIST OF THE CURRENT RATES FOR THIS SERVICE IS AVAILABLE ON REQUEST.

METHODS OF ACCESS TO DATANETT NOW INCLUDE 'DIAL-UP' VIA THE LOCAL PUBLIC TELEPHONE NETWORK. POTENTIAL CUSTOMERS CAN NOW HAVE IMMEDIATE SERVICE USING THIS METHOD OF ACCESS.

(B) ACCESS TO DATA BASES:

THE TELEPHONE COMPANY SHALL BE AGENTS FOR INTERNATIONAL DATA BASES PROVIDING ACCESS TO ITS CUSTOMERS. A LIST OF DATA BASES AND THEIR RESPECTIVE RATES MAY BE PROVIDED AT THE REQUEST OF THE CUSTOMER.



(c) BATCH PROCESSING:

BATCH DATA PROCESSING ALTHOUGH NOT EXCLUDED IS NOT ALWAYS DESIRABLE ON A PACKET SWITCHING NETWORK. CONSEQUENTLY THE TELEPHONE COMPANY RESERVES THE RIGHT TO SCHEDULE AND REGULATE BATCH PROCESSING ON THE PUBLIC DATA NETWORK.

6.4. SCHEDULE OF CHARGES

THE RATES BELOW INCLUDE A LEASED CHANNEL PORT AT A DCO, THE ACCESS LINE BETWEEN THE CUSTOMER'S PREMISES AND THE DCO, AND THE TWO ASSOCIATED MODEMS. THE INSTALLATION CHARGES, HEREIN, SHALL APPLY WHEN THE OUTSIDE PLANT FACILITIES OF THE TELEPHONE COMPANY ARE EXISTING AND AVAILABLE.

IF OUTSIDE PLANT FACILITIES ARE UNAVAILABLE OR NON-EXISTENT, THE ECONOMIC COST OF INSTALLATION SHALL BE BORNE BY THE CUSTOMER.

AT ANY LOCATION REQUIRING SERVICE BUT NOT IN AN AREA PRESENTLY BEING SERVED BY A DCO, SERVICE MAY BE PROVIDED BY MEANS OF A LEASED LINE FROM THE LOCATION TO THE MOST CONVENIENT DCO. THIS SERVICE WILL BE PROVIDED SUBJECT TO THE AVAILABILITY OF THE LEASED LINE BETWEEN THE LOCATION AND THE DCO CONCERNED, AND THE CUSTOMER AGREES TO PAY THE LEASED LINE CHARGES APPLICABLE AT THE TIME.

THE SERVICE INSTALLATION CHARGES BELOW ARE MINIMUM CHARGES BASED ON INSTALLATIONS WITHIN A SINGLE BUILDING.



IN CASES WHERE INSTALLATION REQUIRES INTER-BUILDING CABLE CONSTRUCTION OR OTHER EXTRAORDINARY ACTIVITY (E.G. NON-TYPICAL WIRING WITHIN AN INDUSTRIAL COMPOUND), INSTALLATION CHARGES WILL DEPEND ON THE COST OF THE ACTUAL WORK DONE.

BASIC SERVICE CHARGES:

<u>TRANSMISSION SPEED</u>	<u>INSTALLATION CHARGE</u>	<u>MTHLY CHARGE</u>
110 - 1200 BPS (ASYNCH)	\$500.00	\$ 900.00
1200 BPS (SYNCH)	\$500.00	\$1,200.00
2400 BPS "	\$500.00	\$1,500.00
4800 BPS "	\$500.00	\$2,000.00
9600 BPS "	\$500.00	\$3,000.00

INLAND TRAFFIC CHARGES: \$2.50 PER KILOPACKET

OPTIONAL SERVICE FEATURES

	<u>INSTALL. CHARGE</u>	<u>MTHLY. CHARGE</u>
(1) AUTOCONNECT FEATURE:		
1ST STATION	\$100.00	\$50.00
ADDITIONAL STATIONS	\$ 40.00	\$25.00
(2) PRIVATE NETWORK FEATURE		
ADDITIONAL STATIONS	\$ 40.00	\$25.00



OPTIONAL SERVICE FEATURES:-(CONT'D)

	INSTALL. CHARGE	MTHLY. CHARGE
(3) ROTARY FEATURE	\$100.00	\$40.00
(4) MULTIDROP CONFIGURATION		

FOR EACH ADDITIONAL MODEM ON A MULTIDROP LINE.

<u>TRANSMISSION SPEED</u>	<u>INSTALLATION CHARGE</u>	<u>MONTHLY CHARGE</u>
1200 BPS (SYNCH)	\$300.00	\$202.00
2400 BPS (SYNCH)	\$300.00	\$202.00
480 BPS (SYNCH)	\$300.00	\$432.00
9600 BPS (SYNCH)	\$300.00	\$952.00

THE INSTALLATION CHARGES ABOVE APPLY WHEN THE MULTIDROP CONFIGURATION IS REQUESTED AT THE SAME TIME AS THE BASIC SERVICE.

IF THE MULTIDROP CONFIGURATION IS REQUESTED AFTER THE BASIC SERVICE HAS ALREADY BEEN INSTALLED THEN THE INSTALLATION CHARGE WILL BE \$500.00.

LEASED CIRCUITS, IF NECESSARY, BETWEEN MULTIDROP STATIONS WOULD BE BILLED ADDITIONALLY ACCORDING TO THE LEASED LINE CHARGES APPLICABLE AT THE TIME.



(5) INTERNATIONAL DATABASE ACCESS

DIAL-UP

NETWORK USER REGISTRATION	\$55
NETWORK USER	\$15
TRAFFIC CHARGE	\$70 KILOSEGMENT
	OR \$40 C/MIN
SOURCE PACKS	TT \$ 350 & TIME CHARGES
CARINET	US \$35 & US \$8/HR



OPTIONAL SERVICE FEATURES

	INSTALL. CHARGE	MTHLY. CHARGE
(1) AUTOCONNECT FEATURE		
1ST STATION	\$100.00	\$50.00
ADDITIONAL STATIONS	\$ 40.00	\$25.00
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(4) MULTIDROP CONFIGURATION		

FOR EACH ADDITIONAL MODEM ON A MULTIDROP LINE.

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BASIC SERVICE CHARGES:

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9600 BPS "	\$500.00	\$3,000.00

INLAND TRAFFIC CHARGES:

\$2.50 PER KILOPACKET

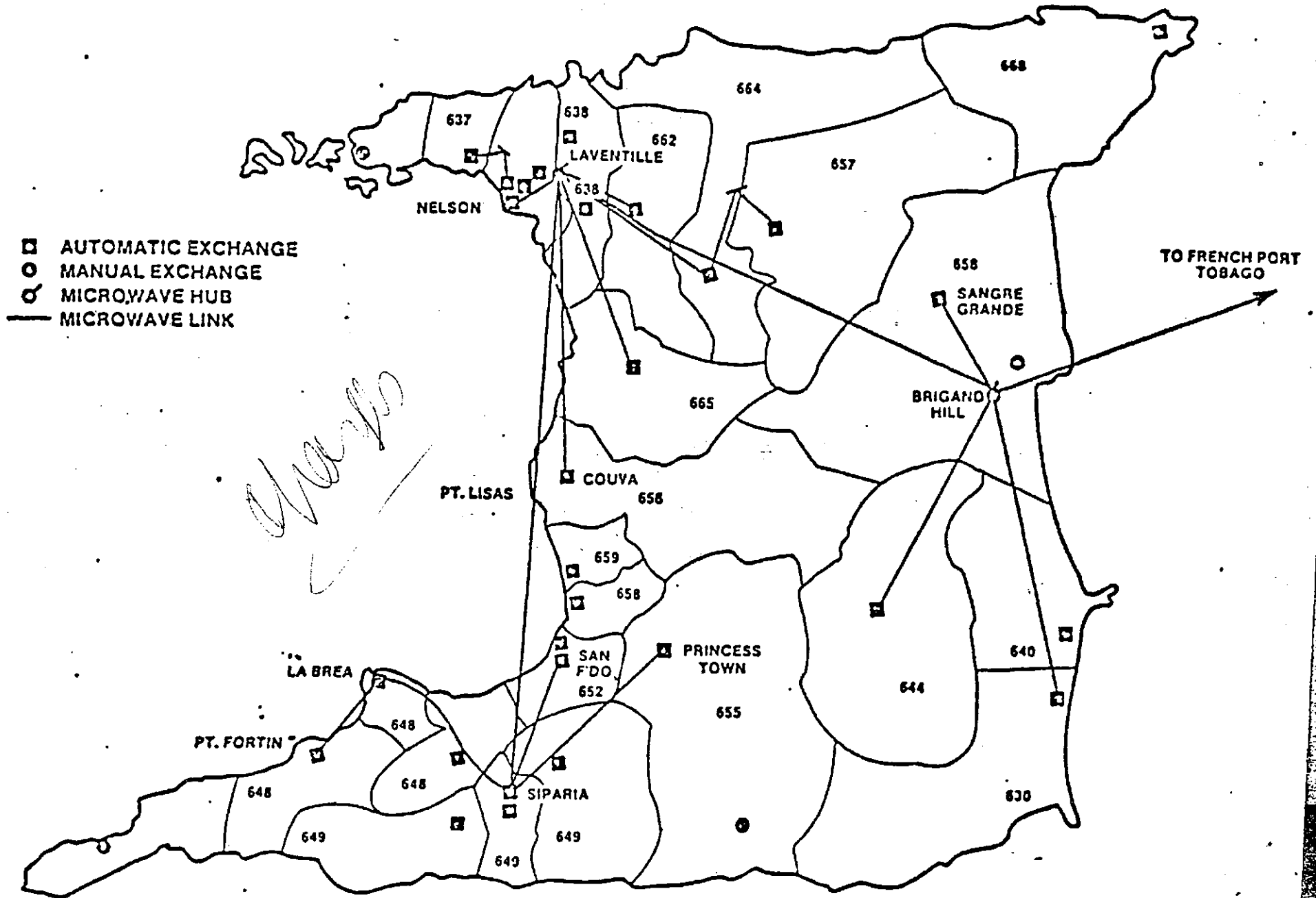
TRANSMISSION FACILITIES

- SUBSCRIBER LOOP CABLE
- INTER OFFICE (TRUNK) CABLE
- MICROWAVE RADIO (DIGITAL & ANALOG)
- FIBRE OPTIC CABLE



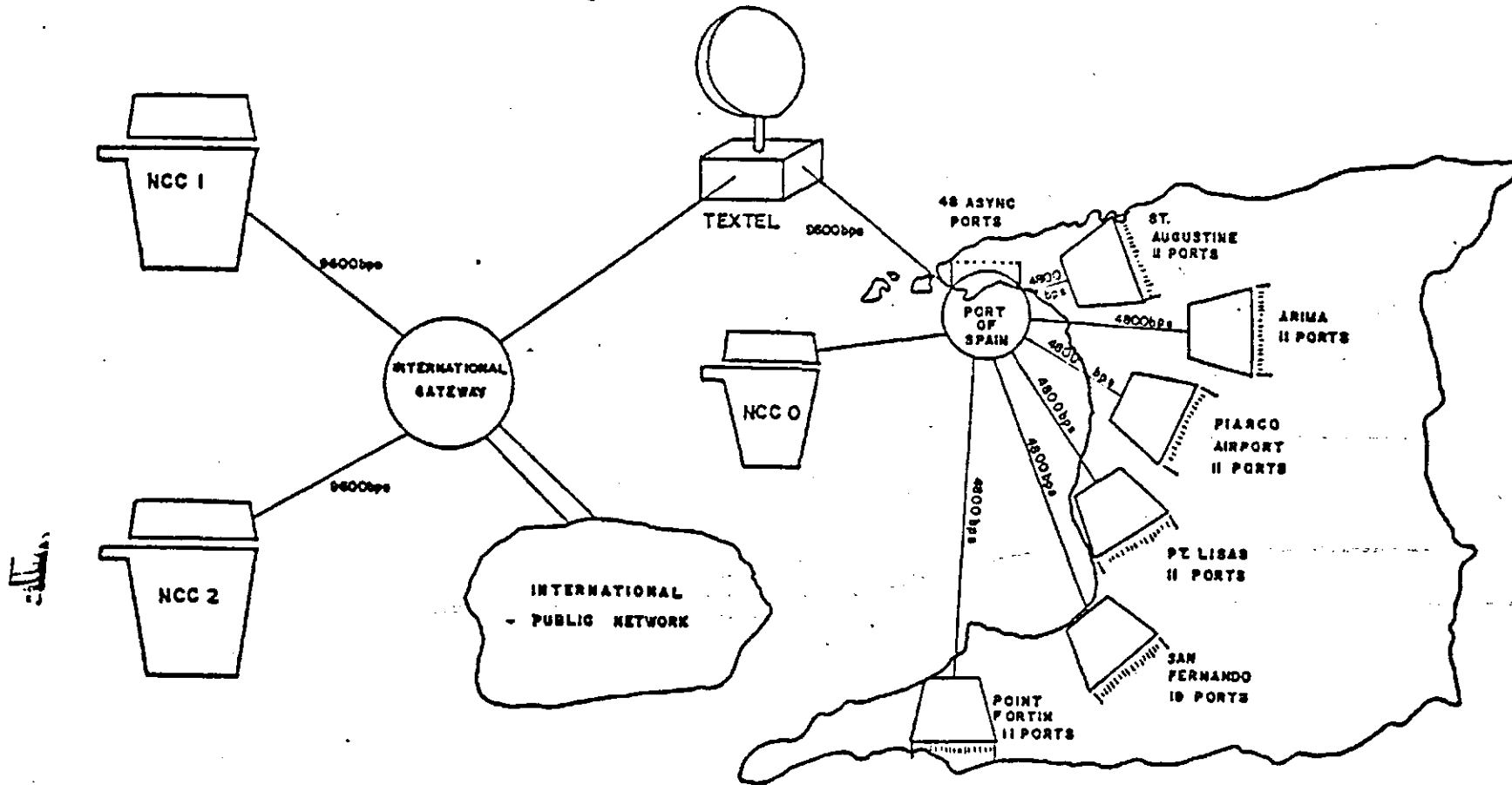


TRINIDAD & TOBAGO
TELEPHONE COMPANY, LIMITED

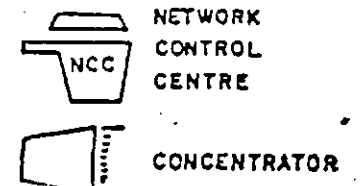


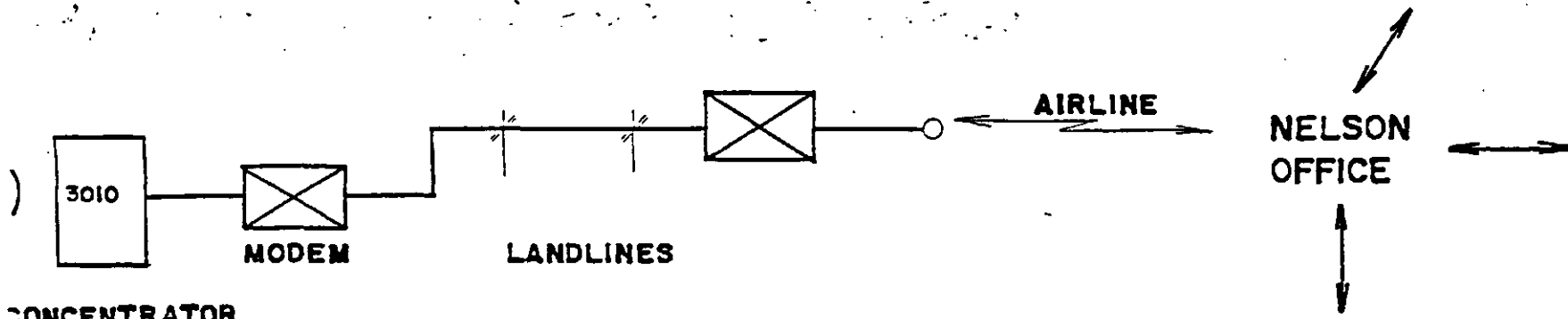


TRINIDAD & TOBAGO TELEPHONE COMPANY LIMITED.



Proposed Network Configuration

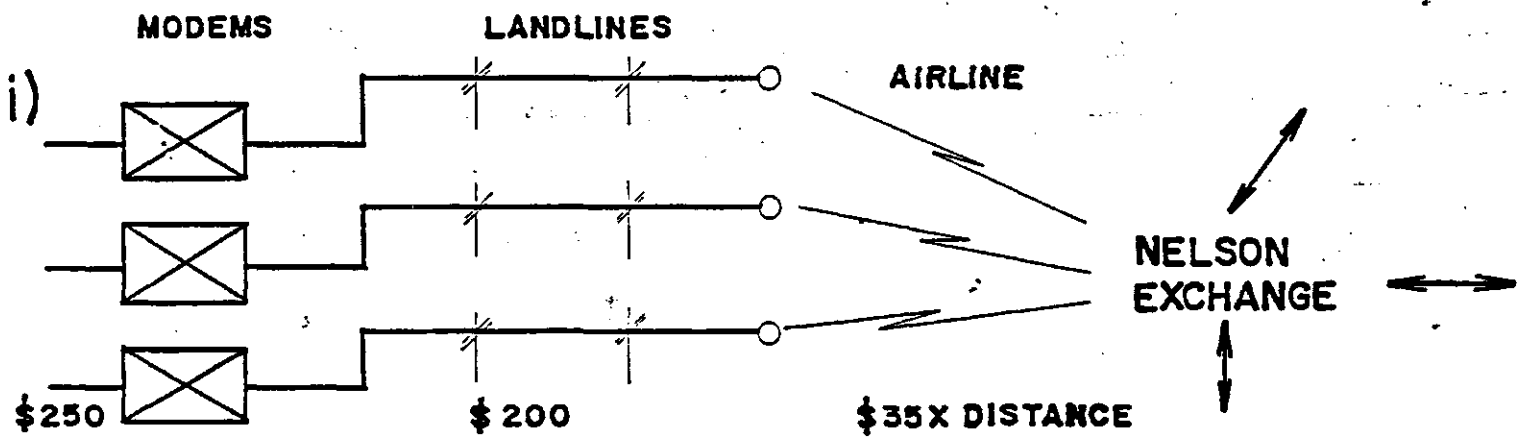




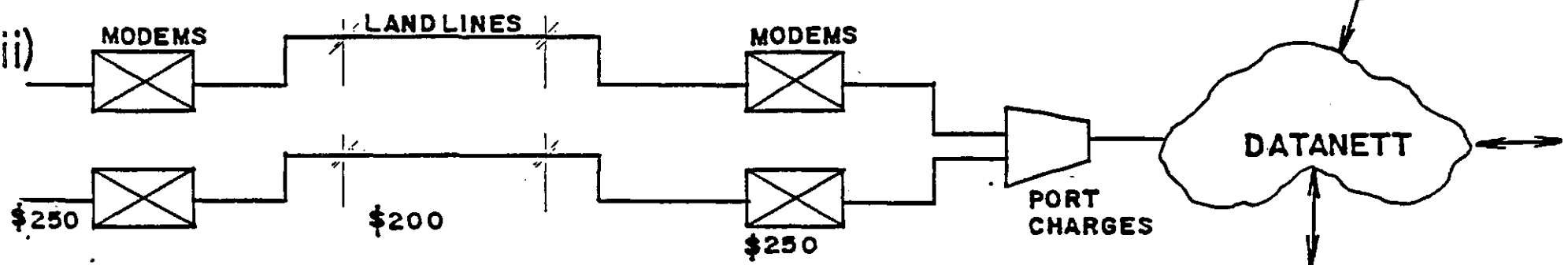
CONCENTRATOR

\$ 2032 \$ 250 \$ 200 \$ 250 \$ 35 X DISTANCE

FOR DATANETT USING CONCENTRATOR ON SITE



FOR LEASE LINES



FOR DATANETT USING ESTABLISHED CONCENTRATORS