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16044

UNIDO Project - UC/DRK/85/096


Upgrading of Industrial Information Services
in Democratic People's Republic of Korea



Field Mission Report: *


Linking of DPRK Information System with UNIDO

Industrial and Technological Information Bank

by Means of Satellite Telecommunications*



Prepared by

V. Teremetsky

UNIDO Expert**


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# TABLE OF CONTENTS

## PREFACE

This report presents the results of the field mission to the Democratic People's Republic of Korea (DPRK) in October 6-13, 1986. The expert was attached to the Central Scientific and Technical Information Institute (CSTII) in Pyongyang.

The purpose of the mission was to test and demonstrate the potential of the satellite communication link Pyongyang - Moscow - Vienna in providing immediate and easy terminal access of Korean information specialists to UNIDO Industrial and Technological Information Bank (INTIB) as well as to information resources of the Institute for Scientific and Technical Information (VINITI), Moscow, USSR.

Telecommunication support of the experiment was provided by the Institute for Automated Systems (IAS), Moscow, USSR.

Of substantial help were the field mission report prepared in the course of the project by Mr. M. Muraszkiewicz, UNIDO consultant, and his memorandum on the on-line retrieval demonstration - dated 26 June 1986.

The expert also expresses his gratitude to the CSTII authorities and specialists for their constant help and for providing all the necessary conditions to successfully fulfil the mission.

## 1. Background and Preparation to the Experiment

Within the course of preparation to the UNIDO telecommunication experiment of linking CSTII with INTIB and VINITI Data Bases the following actions were performed taking into consideration that the experiment was viewed to be the first serious contact of CSTII specialists with sophisticated on-line systems.

1. The appropriate technical means to link the DPRK information systems with worldwide information resources were carefully analysed.

Due to the isolation of the DPR Korea from the telecommunications networks it did not seem relevant trying to organize direct satellite connection with INTIB. Still, because IAS had the permanent X.25 Packet Switching link with West-European telecommunications nodes ("Radio Austria", Vienna and "Datapack", Helsinki) it was considered most sufficient to arrange the satellite link between CSTII and IAS Communication Computer to get reliable access to INTIB and VINITI Data Bases.

2. The intensive discussions were held at IAS in May, 1986, with Korean specialists during the stay in Moscow of CSTII delegation headed by its Director Li-Dong-Guan.

It was decided to organize Pyongyang-Moscow dedicated satellite communications channel for the UNIDO experiment. The two sides agreed to pay for the consequent parts of the channel till the countries' boarders in national currencies during the time of the experiment.

It was also decided that two CSTII specialists should be trained at IAS in preparation to the on-line retrieval.

3. To be able to communicate via IAS computer with INTIB and VINITI the appropriate specification for the CSTII terminal station was prepared and sent to UNIDO. It included desired technical characteristics of a Display Terminal (asynchroncus, ASCII character set), printer and 300 bps asynchronous modem.

The 300 bps speed of transmission was chosen because of a very long distance of the channel and possible noise on degraded lines. It was also suggested that a modem was of a two-wire type with the possibility to work in a dial-up mode (in case of poor quality of the dedicated channel).

4. According to the previous agreement in May 1986 one week training of two CSTII specialists was accomplished. The specialists were intensively trained to the method of on-line working with IAS communication mode, to the procedures of connecting to the remote hosts. They were as well demonstrated the access to INTIB and VINITI Data Bases. The specialists were also provided with all the necessary printed materials (user manuals, instructions, etc.)

5. Starting from the mid-August the two sides approached consequent Ministries of Communications requesting to organize Pyongyang-Moscow dedicated satellite communications channel with two-wire terminations for the purpose of 300 bps data transmission during 1-15 October 1986 UNIDO telecommunication experiment.

2. Objectives of the Mission

According to the Job Description - UC/DRK/85/096/11-01/313.N - the expert was expected to undertake the following tasks:

1. Outline the information flow between sub-systems, sources of information including INTIB.

2. Specify ways and means for obtaining necessary information.

3. Outline technical facilities and staff for satellite connection and appropriate training programme.

4. Prepare the linkage and test the system including a testing programme.

5. Install the relevant equipment necessary for satellite linkage.

6. Carry out necessary experiments.

7. Prepare a final report setting out findings of the mission and recommendations to the Government on further actions which might be taken.

## 3. Activities of the Mission

1. During the first meeting of CSTII, Pyongyang with the authorities and specialists the expert advised the schema of UNIDO telecommunication experiment (Figs. 1,2) outlining of information flow between CSTII terminal station, IAS Communication Computer and remote hosts (INTIB and VINITI data bases) and specifying ways and means of obtaining necessary information. The schedule of INTIB and VINITI on-line retrieval during the experiment was specified.

2. With the help of IAS, CSTII and Ministries of Communications specialists the expert performed the CSTII-IAS dedicated channel testing.

The international part of the channel (Pyongyang-Moscow) proved to be complying to the CCITT* M.1020 recommendation. Particularly, zero level of 800 Hz signal sent from Pyongyang International Telephone Station was received at IAS, Moscow degraded to -13 dBm, noise level being within the allowed limits.

The CSTII two-wire termination line appeared to be of a fairly good quality due to the very short distance between CSTII and Pyongyang International Telephone Station (approximately 2 kilometers). Namely, the measured resistance of the line was only 230 Ohms.

---

* International Cunsultative Committee for Telephony and Telegraphy.

All these measurements allowed the expert to make a conclusion that the established CSTII-IAS dedicated satellite communications channel was suitable for a low-error 300 bps data transmission. The exact bit-error ratio was to be found late on, in the on-line mode.

3.    The expert installed, programmed and tested the equipment of CSTII terminal station:

-    The MPS 3021 Racal-Milgo 300 bps asynchronous modem was programmed (see Annex I) and self-tested using the Error Test (ET) in Analogue Loop Mode (AL);

-    The seven menus of the QUME QVT 119 Display Terminal were set up according to the table presented in the Annex II;

-    The QUME SPRINT 11 PLUS Daisy Wheel Printer with the connection RS-232-C module was programmed as shown in the Annex III.

4.    The expert assembled CSTII terminal station making all the necessary cabling and connected it to the channel. Then, the expert made sure that the station is ready to on-line operation by setting the modem in analogue loop (by means of AL pushbutton) and testing terminal station in the local mode.

5.    After the on-line connection with IAS Communication Node was established the expert performed the Bit-Error Ratio (BER) measurements for the CSTII-IAS channel with the help of test communication programme with standard CCITT Fox Pattern which was residing in IAS computer:

"THE QUICK BROWN FOX JUMPED OVER A

LAZY DOG'S BACK 1234567890 IAS SENDING."

The measured BER for the channel was $1,5.10^{-6}$ which makes it possible to raise, if necessary, the speed in the channel as high as 9600 bps.

6.    When installing and testing the equipment at CSTII the expert encountered the following technical    p r o b l e m s :

(a)    When first turned on the voltage of the electricity supply was as low as 170 Volts, which was not sufficient for the normal operation of the equipment.

This problem was solved by the CSTII specialists with the help of a stabilizer, which allowed to raise the voltage level up to 220 Volts. This level had been preserved unchanged during all phases of the experiment.

(b)    The more serious problems were caused by the V.24 modem-terminal serial interface cable which was provided to the expert by UNIDO after CSTII specialists had claimed the lack of it in the supplied terminal station.

The cable appeared to be done incorrectly connecting the second pin of the terminal V.24 interface ("Transmit Data" circuit - TD) with the third pin of the modem interface ("Receive Data" circuit - RD), and vice-versa.  It was the so-called "twisted" cable usually used between a modem and multiplexer.  This was the reason why the data from the terminal could not at first go to the communication line.

On the expert's request CSTII specialists re-did the cable in a proper way (as shown in the Annex IV).

(c)    Yet another problem occured because QUME Display Terminal, in a default setting, would automatically give Line Feed (LF) after hitting Carriage Return (CR), (see Annex II, Set 6 menu, Return/Enter line - CR=CR+LF).  For this reason it was not possible to complete the LOGIN procedure in IAS Node - the computer would not recognize CSTII ID and Password.

The expert managed to identify this problem with the help of Monitor Mode function of the display (see Annex II, Set 1 menu for monitor on) to display all control characters, and solve it by setting Return/Enter parameter to CR=CR.

7.    The expert performed the demonstration for CSTII specialists of remote terminal access via IAS node to the INTIB and VINITI data bases (example of the session is shown in the Annex V).

8.    The CSTII specialists were trained to operate and programme the equipment of the terminal station as well as to execute basic commands of the IAS communications computer.  In doing this the expert intensively used "hands-on" method.


4.    Output of the Mission

1.    The schema of UNIDO telecommunications experiment was developed which implied satellite connection of CSTII terminal station with IAS communication computer, making use of its dedicated links with West-European computer networks and data bases created in the USSR.

2.    Pyongyang-Moscow satellite communications channel was organized, end-to-end tested and measured.

3.    The CSTII terminal station was assembled, tested, prepared to the on-line retrieval and connected to the satellite channel by means of two-wire termination line.

4.    CSTII specialists were trained to operate and maintain the equipment of the terminal station, to the procedures of getting access to the IAS gateway node and to execute its basic commands.

5.    Four four-hours on-line sessions with INTIB and VINITI data bases were held during the telecommunication experiment where some 70 queries were made and information on computer sciences, electronics, chemistry, plant production, metrology, economy, etc. was received and hard-copied.

The sessions were successfully demonstrated to the DPRK information specialists as well as to the authorities of the DPRK State Committee for Science and Technology.

All sessions were carried out by the CSTII specialists unter the expert's supervision.

6.   Several discussions were held with CSTII authorities and specialists where the results of the field mission were summarized and possible future steps in strenthening CSTII and DPRK on-line information facilities were outlined.

## 5.   Conclusions and Recommendations

1.   In the course of establishment of the DPRK national industrial and technological information system the Government is recommended to pay further attention to creating the network of on-line information centres as a strong means of accessing of external information resources.

2.   The equipment supplied by UNIDO for the CSTII terminal station is well suited to the on-line information retrieval.  Nevertheless, to perform this function more affectively it is proposed that UNIDO should equip it with following necessary accessories:

(a)   Speed Feed 1 Cut Sheet Feeder, QUME Part #86760-01 - 1 pc.
This is most necessary because at the present moment there is no sheet feeder available at CSTII for the QUME SPRINT 11 PLUS printer which makes it very inconvenient to manually reload the printer each time the sheet of paper is out.

(b)   Printwheel ASCII 96 Prestige Elite, QUME Part #82167 - 1 pc.
Additional printwheel is necessary because now the CSTII printer has only one printwheel of this type.

(c)    To allow the effective work with VINITI and other data bases created in the USSR it is recommended that CSTII terminal station be capable to accept and display Cyrillic characters set.  (This fact was also mentioned in Mr. Muraszkiewicz' memorandum.)

To make this possible it is necessary:

-    For printer: To add Cyrillic Printwheel (2 pcs);
-    For display: To incorporate in the keyboard special Cyrillic PROM (programmable memory) chip.  This could be done in co-operation with specialists from IAS or IIASA, Laxenburg.

3.    In the course of development of the DPRK on-line information services and taking into consideration successful results of the UNIDO telecommunication experiment the following further steps are recommended.

To play the role of an INTIB focal point (as suggested in Mr. Muraszkiewicz' report, p.4) and to provide the possibility of on-line retrieval to several branch information centres it is proposed that CSTII should act as remote terminals' concentrator.

It means that it should be equipped either with the high-speed modem with four-channel multiplexing capability (see Fig. 3), or with the Packet Assembler-Disassembler device (PAD), (Fig. 4).

This will allow to organize at least four remote terminal stations outside CSTII connected to the INTIB focal point via low-speed modems.

**The estimated cost for the former variant is:**

- 9600 bps Modem Alpha 96 PLUS of Racal-Milgo (2 pcs) ... US $14.000,-
- Additional terminal stations (similar to the existing one) (3 pcs) ... US $15.000,-
- 300 bps Modem MPS 3021 of Racal-Milgo (2 pcs) ... US $ 2.000,-

Total ... US $31.000,-
============

**The cost for the later alternative can be estimated as follows:**

- 4800 bps Modem MPS-48 of Racal-Milgo (2 pcs) ... US $ 6.000,-
- Additional terminal stations (3 pcs) ... US $15.000,-
- 300 bps Modem MPS 3021 of Racal-Milgo (2 pcs) ... US $ 2.000,-

Total ... US $23.000,-
============

In the second variant Packet Concentrators (PADs) could be supplied by IAS on the basis of CSTII-IAS agreement on scientific and technical co-operation, if concluded. The rest equipment should be provided by UNIDO (in both cases).

These solutions, if taken, will create the background for the DPRK national information network.

4. In view of the above it is suggested that the Government considers the feasibility to undertake necessary steps to conclude CSTII-IAS agreement on scientific and technical co-operation followed by establishing of permanent Pyongyang-Moscow X.25 satellite communications link.

This will allow, for the DPRK national, scientific and technical information system to be permanently linked with worldwide information resources including UNIDO data banks.

## SUMMARY

The report summarizes the results of the field mission, 5-14 October 1986 to the Central Scientific and Technical Information Institute, Pyongyang, DPR Korea, undertaken within the framework of the UNIDO Project UC/DRK/85/096.

The major goal of the mission was to carry out satellite communications experiment of remote terminal access from CSTII to UNIDO on-line information services.

Based on the successful results of the experiment several concrete steps are proposed including expansion of DPRK on-line facilities.

UNIDO Project: Remote data bases access from DPR Korea
via communication satellite

Fig. 1

Fig. 2



INTIB

HOST Computer

Vienna International Center

Communication Satellite

300 bps asynchr.

Communication Processor

Radio-Austria Vienna

X.25

4800 bps

HOST Computer

PAD

Communication Processor

M

IAS Moscow

Remote Terminal Station

M

Pyongyang, DPR Korea

to East-European Data Bases

to Data Bases in USSR

M - modem

PAD - packet assembler-disassembler
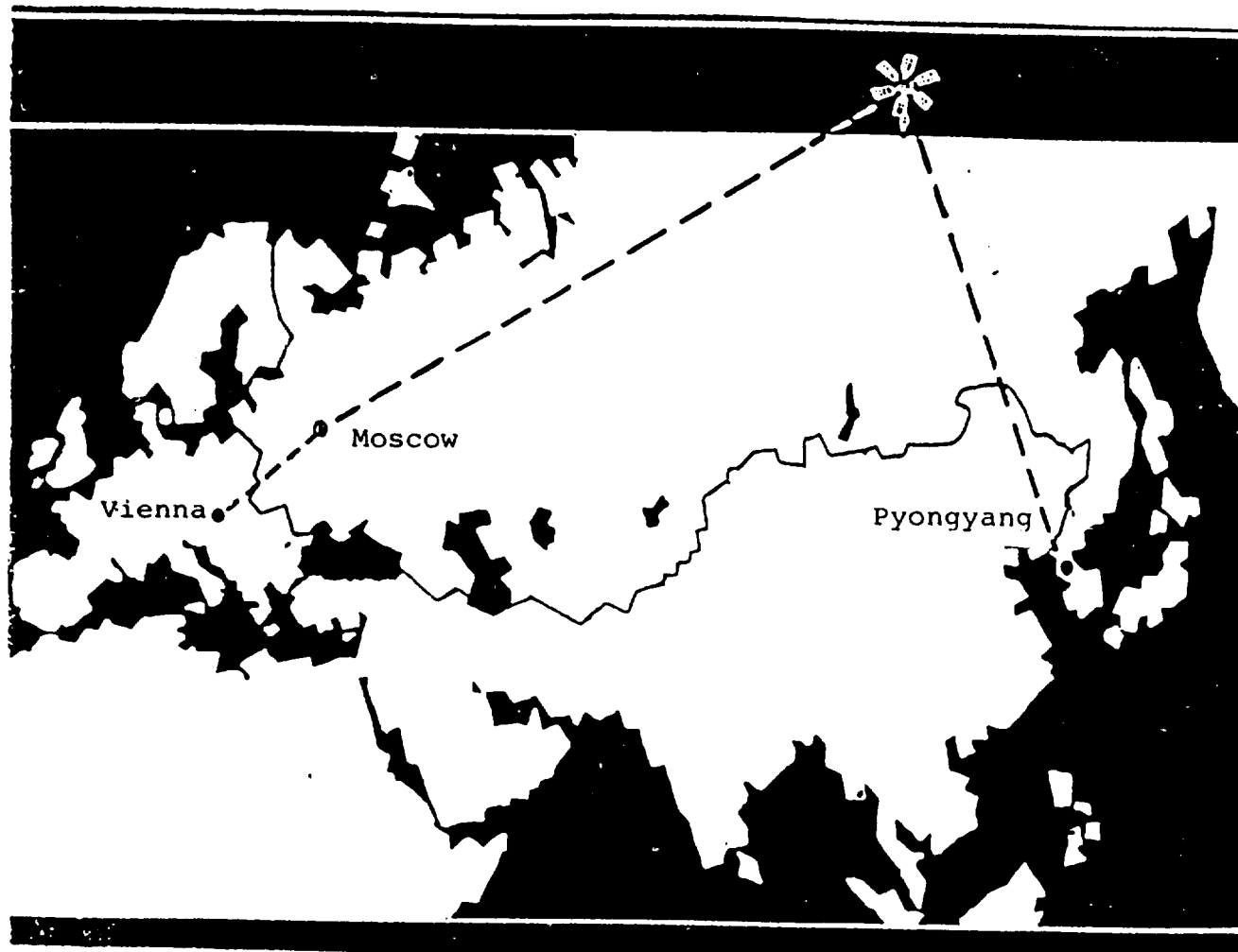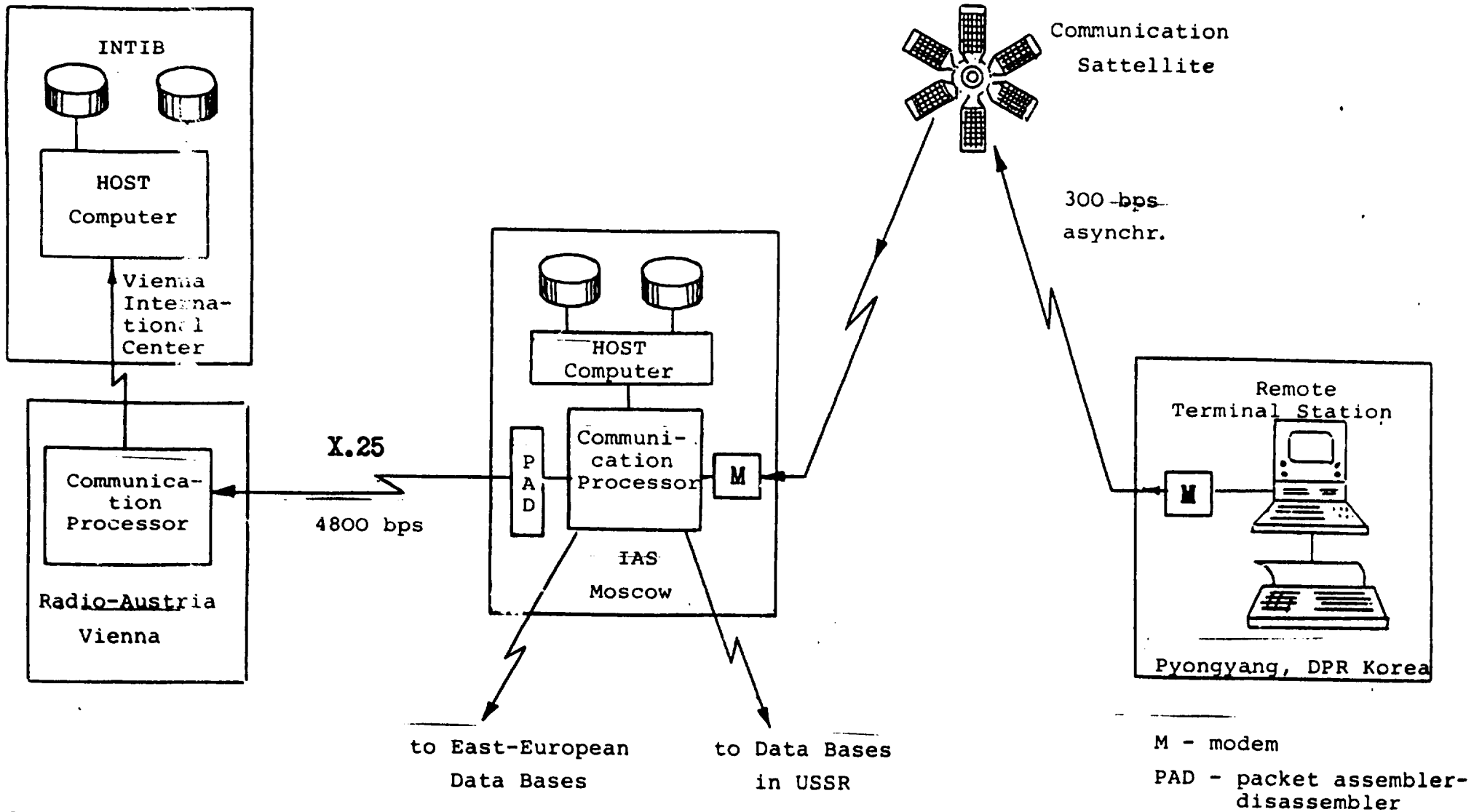
UNIDO Project: Diagram of Remote Data Bases Access from DPR Korea

Fig.3

IAS, Moscow

CST11, Pyongyang

9600 Bps
synchronous
satellite link
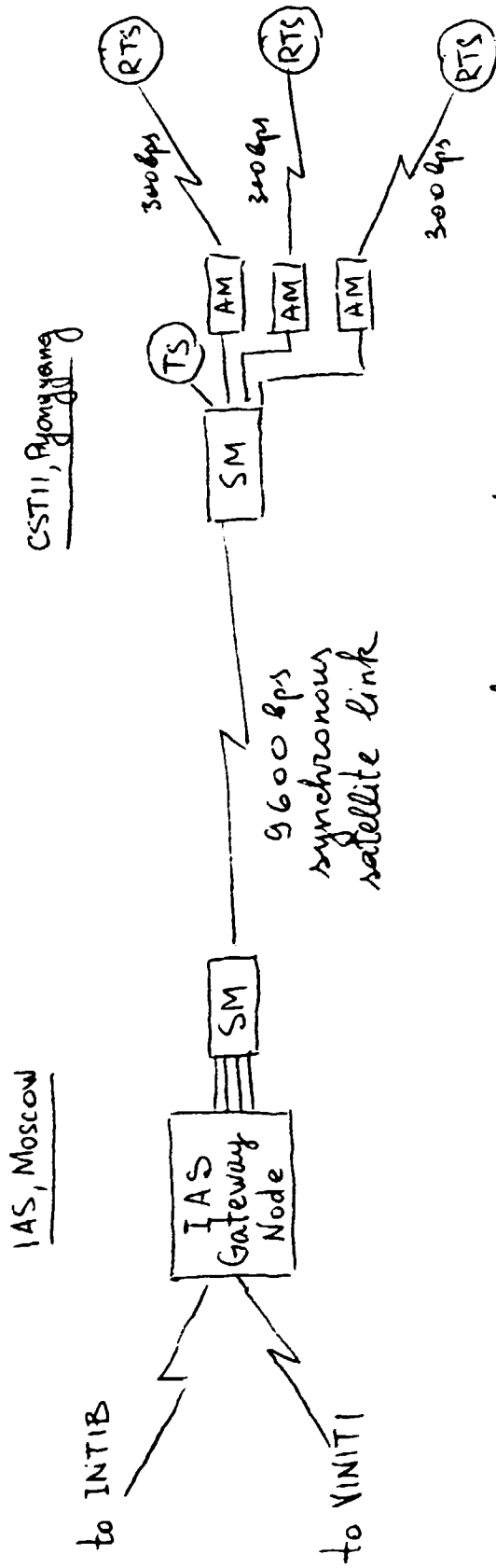
SM — d96 Plus synchronous modem
AM — MPS 3021 asynchronous modem
TS — CST11 Terminal Station
RTS — Remote Terminal Station

Fig.4

IAS, Moscow

to INTIB

to VINITI

IAS
Gateway
Node

...

P
A
D

SM

4800 bps
x.25 satellite
link

SM

CSTI, Pyongyang

P
A
D

TS

AM

AM

AM

RTS

RTS

RTS

PAD – Packet Assembler-Disassembler
SM  – MPS-48 synchronous modem
AM  – MPS-3021 asynchronous modem
TS  – CSTII Terminal Station
RTS – Remote Terminal Station
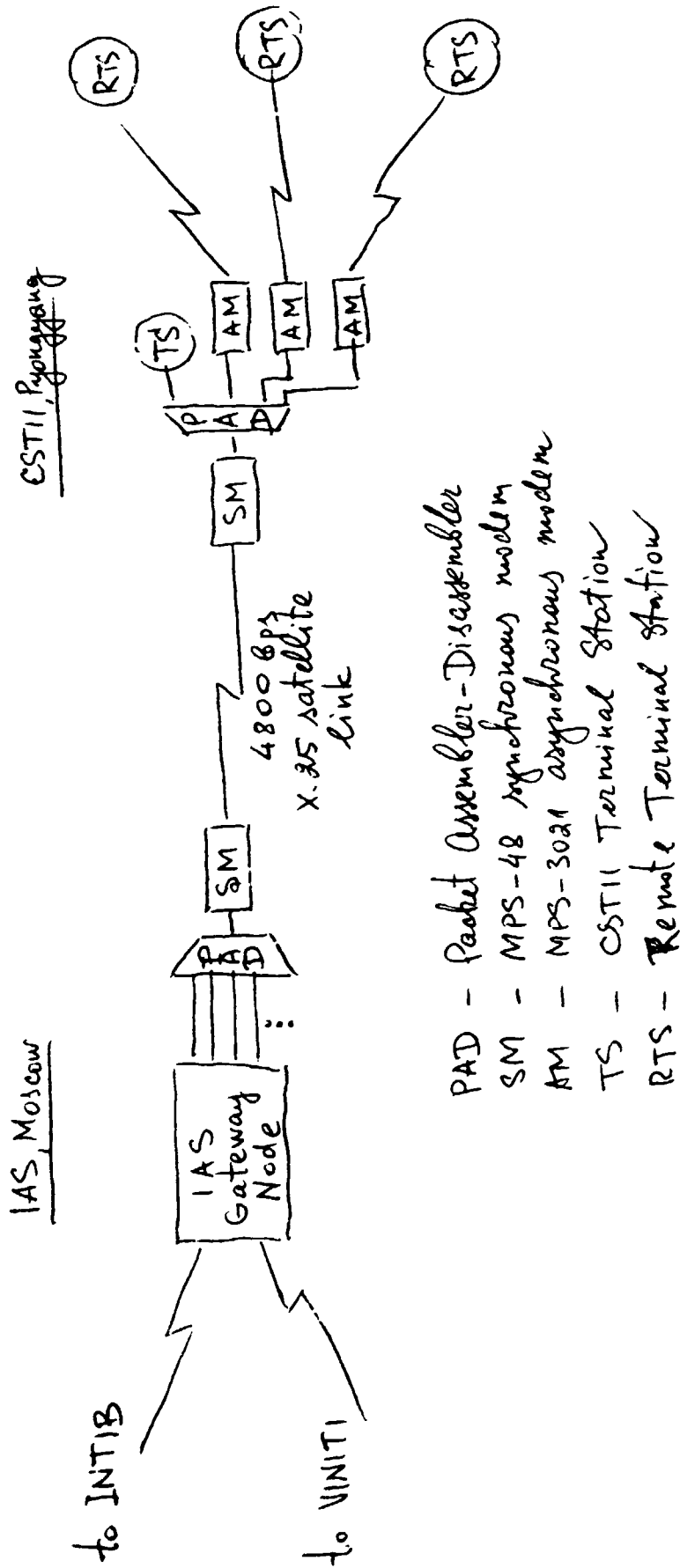
# ANNEX 1

## The MPS 3021 Modem Programming (main switches)

| Switch | Position | Description |
|--------|----------|-------------|
| A1 | closed | DCD Delay (20 ms) |
| A2 | open | DCD Threshold (38 dbm) |
| A4 | open ) | |
| A5 | closed ) | |
| A6 | open ) | Transmit output level (-6 db) |
| A7 | closed ) | |
| A8 | open ) | |
| B1 | closed | Leased line operation |
| B7 | closed | CTS Delay (35 ms) |
| C1 | closed | DTR Force Control (internal) |
| C2 | closed | RTS Control (internal) |
| F, G | in | Leased line operation |
| K | out ) | Channel select |
| L | in ) | (via front panel switch) |

# ANNEX 2

## QUME QVT 119 Display Terminal (menus setting)

| Menu | Parameter Block | Description |
|------|-----------------|-------------|
| Set 1 | Transmission mode | Full duplex (FDX) |
| | Data transmit mode | Conversational (Conv.) |
| | Column mode | 80 columns |
| | Emulation mode | QVT 119 |
| | Keyboard | On |
| | Printer interface | Copy |
| | Monitor mode | Off |
| | Graphics mode | Off |
| Set 2 | Scroll mode | Jump |
| | Key repeat | On |
| | Key click | On |
| | Margin bell | On |
| | End of message character | Nul |
| Set 3 | Line wrap mode | On |
| | Charriage return/Line feed | CR |
| | Scroll mode | On |
| | Handshake mode | DTR only |
| | Limited transmit mode | Off |
| Set 4 | EIA part configuration | Host |
| | Data bits per character | 7 bits |
| | Bit 8 set | 0 |
| | Parity select | On |
| | Parity mode | Even |
| | Stop bits | 1 |
| | Receive band rate | 300 |
| | Transmit rate | 300 |

## ANNEX 2 (continued)

| Menu | Parameter Block | Description |
|------|-----------------|-------------|
| Set 5 | AUX port configuration | Print |
| | Data bits per character | 7 bits |
| | Eit 8 set | 0 |
| | Parity select | On |
| | Parity mode | Even. |
| | Stop bits | 1 |
| | Receive + transmit band rate | 300 |
| Set 6 | Page/Split mode | Page Mode |
| | Video | Standard |
| | Return/Enter | CR/CP |
| | Protect mode attribute | Norm |
| | Parity error detect character | Off |
| Set 7 | Cursor attribute | UL Blink |
| | Time | 15 min |
| | Keyboard type | US |
| | Status | Off |
| | Frequency | 6C |

# ANNEX 3

## QUME SPRINT 11 PLUS (printer programming)

(a)     QUME Connection DIP Switch:

| Pin | Setting | | Description |
| --- | --- | --- | --- |
| 1 | On | | Full Duplex |
| 2 | On | | Stop on paper out |
| 3 | Off | ) | |
| 4 | On | ) | 300 bps band rate |
| 5 | Off | ) | |
| 6 | Off | ) | Handshaking |
| 7 | On | ) | (DTF) |
| 8 | Off | | No modem |
| 9 | On | ) | Parity |
| 10 | Off | ) | (EVEN) |

**(b)   Printer DIP Switch Setting:**

| Position | Pin | Setting | | Description |
|----------|-----|---------|---|-------------|
| Left | 1 | Off | ) | Spacing |
| | 2 | Off | ) | (10 Pitch) |
| | 3 | Off | | 6 Lines/Incr. |
| | 4 | Off | | AUTO LF OFF |
| Right | 1 | Off | ) | |
| | 2 | Off | ) | Form Length |
| | 3 | On | ) | (4") |
| | 4 | Off | ) | |
| Back | 1 | Off | ) | |
| | 2 | Off | ) | Twintellect |
| | 3 | Off | ) | (Not used) |
| | 4 | Off | ) | |
| | 5 | On | | AUTO BIDI PRINT |
| | 6 | On | | AUTO CR/LF |

## ANNEX 4

## V.24 Serial Interface Modem-To-Modem Cable

| Circuit Description | (No.) | Pin Terminal | Modem |
|---|---|---|---|
| Transmit Data | (103) | 2 ------------------ | 2 |
| Receive Data | (104) | 3 ------------------ | 3 |
| Signal Ground | (102) | 7 ------------------ | 7 |
| Data Terminal Ready | (108) | 20 ------------------ | 20 |
| Request to Send | (105) | 4 -- | |
| Clear to Send | (106) | 5 -- | |
| Data Set Ready | (107) | 6 -- | |
| Data Carrier Detect | (109) | 8 -- | |

## Example of the On-Line Session

MONDAY, 13-OCT-1986, 10:58:53

WHAT IS YOUR NAME? CSTII
TYPE PASSWORD:

     YOU HAVE ENTERED THE  U.S.S.R.  N C A D E  NODE


                A T T E N T I O N !

1. VINITI WILL NOT BE AVAILABLE TILL NOVEMBER DUE TO SYSTEM MAINTENANCE.

2  NCADE NODE WILL BE OPERATIVE AT 11 OCTOBER.

3. IVTANTHERMO DATABANK WILL BE AVAILABLE FOR USERS WHO  HAVE
   PASSWORDS FOR IT EVERY FRIDAY.

4. GPNTB DB WILL BE ACCESSIBLE VIA NCADE-NODE  AT NEAR FUTURE



NCADE-NODE: GET DP3
YOU ARE CONNECTED TO LINE
ATTENTION CHARACTER CTRL/B



Packet Assembly Disassembly X.25 software. IAS (K)


PAD PORT N2
PAD>?-023226221047
COM

IAEA LOGIN
CICS
CONNECTING

CONNECTION ESTABLISHED; PLEASE CONTINUE 09:01:52
USVS XULHTP 1620 IDA

N E W S  not supported on this terminal
IDA

R1203 - DATA BASE UNKNOWN - PLEASE RE-ENTER
IDA

R1208 - ENTER PASSWORD FOR ENTRY SERVICES OR HIT ENTER


RXX01 - SELECT THE DESIRED FUNCTION

=KOREA DPR

```
     -- PAGE 001 --
QUERY ELEMENT #002
------------------
P=000018    KOREA DPR
T=000018 - #002: KOREA DPR
```

```
     -- END --
D
```

```
     -- PAGE 001 --
15253                    1985
Adamczyk, Czeslaw
Kowalski, Wieslaw
Natkaniec, Jerzy
UNIDO
(R) KOREA DPR. IMPROVEMENT OF PRODUCTION OF ALLOY STEEL IN BASIC OXYGEN
   FURNACE. FINAL REPORT.
DI/DRK/84/801
Vienna, 1985. 103 p. tables, diagrams.
:::::
    <UNIDO pub>. <Expert report> on assistance to <iron and steel industr
    <Korea DPR> - covers (1) the basic <oxygen> <furnace> technology for
    production of high quality <steel> <alloys>; the production of stainl
    steel (2) guidelines for improvements in indigenous <metallurgy> to p
    new steels with low <capital investment> and to develop modern second
    steel making processes; <training> of <counterpart personnel>.
    <Recommendations>, <bibliography>. <Restricted>.
ENGL
36.10
```

```
     -- MORE --
```

P/+1
-- PAGE 002 ---
15228                          1985
Sinclair, Stuart
UNIDO
CHANGES IN THE INTERNATIONAL PATTERN OF PRODUCTION AND TRADE IN CONSUMER
   ELECTRONICS.
Vienna, 1985. 31 p. tables, graphs.
::::
   <UNIDO pub>. <Expert report> on major trends and <technological change
   the consumer <electronics industry> - covers (1) <world production> an
   <trade> (2) <location of industry> influencing <prices> through offsho
   <processing> and <assembling> of <components>; <protectionism>, <joint
   venture>s, <licensing> agreements, <automation> (3) the case of <Korea
   and the USA. Conclusions. <Statistics>. Additional references: <televi
   sets>, <telecommunications>, <transistors>, <radio sets>,
   <microelectronics>.
ENGL
38.10

-- MORE --
P/+1
-- PAGE 003 --
15199                          1985
Panov, V.P.
UNIDO
(R) DPR KOREA. ASSISTANCE TO OVERCOME PRODUCTION QUALITY PROBLEMS THROUGH
   IMPROVEMENT OF THE NATIONAL STANDARDIZATION SYSTEM. FINAL REPORT.
SI/DRK/85/802
Vienna, 1985. 59 p.
::::
   <UNIDO pub>. <Final report> on assistance to <standardization> in <Ko
   DPR> - covers: activities at the national <standards institute>;
   <organizational aspects>; <staff>; <industrial services>; technical
   <documentation>; development of <standards> and <specifications>.
   <Recommendations>, <job description>. Additional references: <quality
   control>, <knowhow>, <training programmes>. <Restricted>.
ENGL
25.50

-- MORE --
EXIT

RXX03 - CONTROL RETURNED TO  C.I.C.S.