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IMPROVED CONNECTIVITY FOR DATA AND VOICE

(Presented by India)

SUMMARY

This working paper presents the progress on implementation of VSAT to VSAT and/ or OFC Connectivity for domestic and International data & speech transmission by India.

1. INTRODUCTION

The status on deployment of VSAT technology for implementation of data and speech transmission for domestic as well as International circuits by India is presented in this paper.

Progress

2.1 Connectivity

2.1.1 Connectivity with Neighbouring Countries.

Airports Authority of India is in the process of providing primarily end-to-end OFC links for data and speech communication within the country and with neighbouring countries and VSAT links as standby. Wherever OFC link is not feasible & uneconomic, AAI will go for VSAT connectivity. In this way following advantages of OFC technology will be helpful:

1) Noise Immunity

Fiber optic cable is a dielectric and is not affected by electromagnetic or radio frequency interference and provides shielding to prevent electromagnetic radiation or pick up. The potential for lower bit error rates can increase circuit efficiency. Fiber Channel does not allow an error to occur in 10^{-12} bits. That's one bit error in one trillion bits transmitted. Fiber optics is the only medium that can transmit through a harsh electrical environment.

2) High Data Rates At Long Distances

Low Loss (Attenuation)

Current single-mode fibers have losses as low as .2dB per km. Multimode losses are down to 1dB/Km creating opportunities for longer distances without repeaters.

High Bandwidth (large data rates)

Fiber optics has been bandwidth tested at over 350 billion bits per second over a 100km (60miles) distance. Theoretical rates of 200-500 trillion bits/s are obtainable.

3) Transmission Security

Fiber being a dielectric does not radiate electromagnetic pulses, radiation, or other detectable energy. This makes a fiber cable difficult to locate and sabotage. Since methods to tap into fiber create a substantial system signal loss, intrusion is easily detected.

4) Safety

No Short Circuits

Since fiber does not carry electrical current, radiate energy, or produce heat or sparks, data stays within the fiber medium.

No Spark or Fire Hazard

Fiber optics provides a path for data without transmitting electrical current. Thus for applications in dangerous or explosive environments, fiber optics provides a safe transmission medium.

5) Wide Temperature Range

Fibers and cable can be manufactured to tolerate temperatures from -40°F to +200°F. Resistance to temperatures of -100°F to +1,000°F have been recorded.

6) Stable Performance

Fiber optics are less affected by moisture which means less corrosion and degradation. Therefore, less maintenance is required for the physical plant. It also offers greater temperature stability than copper systems.

7) Costs

Increasing competition, larger manufacturing volumes, standardization of common products, greater repeater spacing, and proven effectiveness of multimode fibers for short distance applications have all contributed to decreased costs.

In view of above advantages it seems that OFC communication is the best means for point-to-point and closed user group (CUG) communications. With the introduction of OFC in data and speech communication distance & bandwidth are not the limitations and for future expansions only cost of end equipment will be involved. Moreover laying of OFC cable is normally done in triangular form, therefore redundancy is maintained in cost effective way without imposing overburden on users. Although initial cost is high in laying cables but the same is compensated by less maintenance cost and prolong use.

Specific Advantages of Fiber over Satellite

SNO	Characteristic	Optical Fiber	Satellite
1.	Bandwidth	Theoretically limit of 1 Terahertz, currently 1-10 GHZ	Typically transponder has a bandwidth of 36 – 72 MHZ
2.	Immunity to interference	Immune to electromagnetic interference	Subject to interference from various sources like ionosphere, electromagnetic waves, etc.
3.	Security	Difficult to tap without detection	Signals must be encrypted for security

In support of OFC implementation plan, AAI has collected data related with the implementation of OFC links with neighbouring countries and its serviceability enclosed as Annex “A”.

It prevails that most of the places are interlinked with OFC Links, specially our service providers both Govt. as well as private vendors, have OFC network all over the country. In this case it will be easy to implement OFC connectivity with neighbouring countries if they are also ready to cooperate and implement it by pursuing at their end with their service provider. Hence data as well as speech can be shifted on a single high-speed link.

2.1.2 **Deployment of VSAT Technology in India**

AAI has planned to network all Indian airports including civil enclave using VSAT technology through Dedicated Satellite Communication Network (DSCN). Two Transponders from different INSAT Satellites will be used for this purpose. A total number of 81 VSAT terminals are proposed to be installed by the end of this year.

DSCN is solution to upgrade all the landlines through Geo-stationary Satellite, which will provide higher speed and more efficient service as compared to conventional systems using physical pairs.

DSCN shall have the capability of operating seamless data as well as speech on VSAT links over land mass area in India wherever OFC connectivity is not feasible. Otherwise these links would work as backup to OFC based circuits.

2. **ACTION OF THE CONFERENCE**

The conference is invited to take note of the information contained in this paper.

Details of Media of LTT/DSC/IDD Hotlines between Kolkata & neighboring countries

KOLKATA

S N O	Circuit Type	Stations	Built-up stations	Type of Media	Serviceability / Performance
1.	IDD Hotline (BSNL)	Kolkata - Dhaka	Kolkata Airport – Tel Bhavan Tel Bhavan- Krishnanagar (India) Krishnanagar – Chaudanga Chaudanga (Bangladesh)- Dhaka	OFC OFC MW OFC	100 %
2.	64 KBPS data circuit (VSNL)	Kolkata - Dhaka	Kolkata Airport –DUM DUM DUM DUM - Kolkata VSNL Kolkata VSNL – Mumbai VSNL Mumbai VSNL – Arvi (Narayangaon) Arvi (Narayangaon) – BTTB BTTB (Bangladesh) - Dhaka	OFC OFC OFC OFC Satellite OFC	96.12 %
3.	IDD Hotline (BSNL)	Kolkata - Kathmandu	Kolkata Airport – Tel Bhavan Tel Bhavan – Birgang (Nepal) Birgang – Kathmandu	OFC OFC MW	99.47 %
4.	IDD Hotline (VSNL)	Kolkata - Yangon	Kolkata Airport – DUM DUM DUM DUM – Kolkata VSNL Kolkata VSNL – Mumbai VSNL Mumbai VSNL – Arvi (Narayangaon) Arvi (Narayangaon) – Yangon Yangon - Airport	OFC OFC OFC OFC Satellite MW/ UHF	95.74 %

Details of Media of LTT/DSC/IDD Hotlines between Delhi & neighboring countries

- DELHI

S N O	Circuit Type	Stations	Built-up stations	Type of Media	Serviceability / Performance
1	IDD Hotline	Delhi – Karachi Delhi – Lahore Delhi - Kathmandu	NATS - NITC NITC- Janakpuri Exchange Janakpuri Exchange – Distant end	Physical pair OFC UHF/ Satellite	Satisfactory
2	DSC CCT	Delhi – Lahore Delhi Karachi	NATS - NITC NITC – PCM Janpath PCM Janpath – Coaxial Delhi Coaxial Delhi– Amritsar Coaxial Amritsar Coaxial – PBTT Lahore PBTT Lahore - Airport (Lahore/Karachi)	Physical pair OFC TIE Line OFC MW OFC	Satisfactory
3	LTT CCT	Delhi - Tashkent	NATS - NITC NITC- Janakpuri Exchange Janakpuri Exchange – Distant end	Physical pair OFC UHF/ Satellite	Satisfactory

Details of Media of LTT/DSC/IDD Hotlines between Chennai & neighboring countries

- CHENNAI

S N O	Circuit Type	Stations	Built-up stations	Type of Media	Serviceability / Performance
1	SPEECH CCT	VOMM – VCBI Chennai- Colombo	Equipment – BSNL Exchange Local Lead Station – Station Remote Local lead	OFC OFC OFC/ Submarine	Good
2	64 KBPS DATA/ VOICE	VOMM – WMKK Chennai – Kuala Lumpur	Equipment – BSNL Exchange Local Lead Station – Station Remote Local lead	OFC OFC TIE Line	Good
3	IDD Hotline	VOMM – WIMM Chennai - Medan	Equipment – BSNL Exchange Local Lead Station – Station Remote Local lead	OFC OFC TIE Line	Good
4	IDD Hotline	VOTV – VCBI Trivandrum-Colombo	Station – Station Remote Local lead	Coaxial	Good
5	IDD Hotline	VOTV – VRMM Trivandrum - Male	Station – Station Remote Local lead	Coaxial	Good

Details of Media of LTT/DSC/IDD Hotlines between Mumbai & neighboring countries

- MUMBAI

S N O	Circuit Type	Stations	Built-up stations	Type of Media	Serviceability / Performance
1	IDD HOTLINE	Mumbai - Karachi	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC Satellite	
2	SPEECH CCT	Mumbai - Muscat	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC Satellite	
3	LTT CCT	Mumbai– Bangkok	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC OFC	
4	LTT CCT	Mumbai -Colombo	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC OFC	
5	LTT CCT	Mumbai - Karachi	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC Satellite	
6	DIALUP CCT	Mumbai - Paro	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	PSTN PSTN	
7	LTT CCT	Mumbai - Muscut	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC Satellite	

Details of Media of LTT/DSC/IDD Hotlines between Mumbai & neighboring countries

MUMBAI - II

S N O	Circuit Type	Stations	Built-up stations	Type of Media	Serviceability / Performance
8	LTT CCT	Mumbai - Nairobi	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC Satellite	
9	LTT CCT	Mumbai-Seychelles	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC Satellite	
10	LTT CCT	Mumbai–Kathmandu	Airport Tech Block – Service Provider One station to other Station Remote Local Lead	OFC Physical Pair	

Details of Media of LTT/DSC/IDD Hotlines between Guwahati & neighboring countries

GUWAHATI & AGARTALA

S N O	Circuit Type	Stations	Built-up stations	Type of Media	Serviceability /Performance
1	IDD HOTLONE	Guwahati - Dhaka	Guwahati Airport – Borjhar BSNL Exch Borjhar – Panbazar (Guwahati City) Guwahati City – Dhaka (Bangladesh) Remote Local Lead	U/G Cable OFC MW	
2	IDD HOTLONE	Agartala - Dhaka	Agartala TWR – Airport Exch Airport Exch- Agartala Main Exch Agartala Main Exch – Agartala MW Agartala MW – Guwahati MW Guwahati MW - Kolkata MW Kolkata MW – Kolkata VSNL VSNL Kolkata – Dhaka Remote Local Lead	UG Cable OFC OFC MW MW OFC MW	