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OBIU and BRI U-Reference Deployment

TB-003, March 22, 2001

1 Introduction

The TB series of documents are Initia Technical Bulletins for customers and resellers.

The purpose of this document is to cover common questions that arise when considering BRI U-Reference deployment using the Initia OBIU-U (Octal U-Reference BRI Interface card for the AccessSwitch).

2 Cable Distance and ST & U Interfaces

Lines of the OBIU ST interface can be run out to a maximum distance of **3000 feet** using 4-wire Cat-5 twisted pair, if the maximum line loss is no more than 6db. Initia has numerous customers in both the private and government sectors running ST-ref BRI out to its maximum 3000-foot distance.

OBIU-U interface lines can be run up to a maximum distance of **18,000 feet** using 2-wire Cat-5 twisted pair. The first installation of the OBIU-U interface was at a major aircraft manufacturers campus site. U-reference BRIs run from their data center out to two buildings located between 2.5 and 3 miles away.

Whenever there are reported problems with either type of OBIU BRI interface, it is usually found to be the fault of the customer premises wiring exceeding the maximum 6db of allowable loss (i.e., non-CAT-5 cable, excessive or bad taps and/or splices, bad copper, wet lines, bad punch-downs, etc.).

Initia tests all OBIU ST cards, both for the slotted and stackable switches for BABT compliance. The Initia BABT test station drives a spool of cable tuned by length to 6db, then a B-to-B channel call is connected and a BER test performed.

3 OBIU-U Reference

Advantages of BRI U-ref over ST:

1. Longer line lengths – U-ref allows max line lengths of up to 18,000 feet (about 3.5 miles) vs. a max line length of 3000 feet for ST
2. No special building/campus wiring required: U-ref allows the use of standard 2-wire phone cable (Cat-5 for maximum distance), instead of having to run two twisted pairs (4-wires). Most existing building and campus POTS phone wiring can be used for U-ref BRI.

4 Is an NT-1 needed?

Yes, if you are connected to any U-ref line and your terminal equipment or terminal adapter is ST-reference and not U-reference (U-ref will have a built-in NT-1).

The OBIU-U was not deployed in Europe because there was no demand at the time of its initial design and release (August 1997). The European carriers own and control the NT-1s, so as a result, only ST reference terminal equipment is found on the customer premises. **The OBIU-U has not been homologated by Initia for use outside North America**. It cannot be used to connect to a network (public or private) because downstream (port side) connections and protocols were never implemented. The OBIU-U does not support upstream (trunk side) protocols, nor does it support network Derived Clock. Again, because the NT-1 is considered Central Office (CO) equipment and only ST is ever delivered to the CPE, the OBIU-U would never be required to connect to the public network in Europe even if it did have all the approvals and supported the protocols and clocking.

The OBIU-U cannot be deployed in Europe, unless the OBIU-U is deployed strictly within a private network.

5 Does Initia recommend any particular NT-1?

No, but Initia has interoperability tested with Lucent/AT&T's NT1B-300, Adtran's NT-1 ACE, Nortel's UT620F NT-1 and the Tone Commander NT1U-220C. Initia tested each of these NT-1's and the U-ref interface card magnetics using a TAS 2200A Loop Emulator, both with and without line impairments, using Bell Core Standard Loops 1 - 15 (conform to ANSI T.601 specifications). Over the years since the OBIU-U card's development and release, Initia has also run a multitude of U-ref codecs and terminal adapters (all having their own built-in NT-1's) and has never encountered a compatibility issue.

6 Can I use an NT-1 to connect U-ref terminal equipment to an ST port?

No! The NT-1 will only convert **upstream** 2-wire U-ref to **downstream** 4-wire ST. It cannot convert ST to U ref.

7 Do the Initia BRI interfaces (U or ST) support "Phantom Power?"

No! Devices connected to the U or ST Initia BRI interfaces require external power (-48vdc). Power must be supplied by a Line Power adapter that applies -48vdc to the ST signal leads on pins 3, 4, 5 & 6 (PS1 Power) or to pins 7 & 8 of the 8-wire RJ-45 connection to the terminal equipment (PS2 Power). Alternatively, power could come from an external line cord or power adapter (usually for more power hungry equipment like video codecs, terminal adapters, full-featured phone sets, etc.). Phantom Power is a term used to describe the limited PS1 power usually applied by the CO equipment. **Initia BRI interfaces supply no Phantom PS1 power.**

Additional information regarding PS1 and PS2 power as it relates to North American and European ISDN implementation:

- In North America, current ISDN phone/terminal equipment uses PS2 power only, which must be supplied by Line Power Adapters designed for use in North America. No ISDN phones manufactured for use in North America rely on PS1 power. This is perhaps because North American BRI lines are U-reference and the NT-1 (considered to be CPE here) always supplies PS2 power. Only some NT-1s will provide PS1 power as well, apparently because North American ISDN phone sets don't use it. Since all NT-1s require an external power source, loss

of local power means the CPE ISDN equipment is usually down. Even if phantom power were present on the network lines, it would not power the NT-1, nor would it be passed to the equipment though the NT-1. It is assumed that in larger ISDN networks, the NT-1s would be on some sort of backup (UPS) power.

- In **Europe**, ISDN phone/terminal equipment uses PS1 power. PS2 is never used and is considered for local use only. As a result, ISDN terminal equipment built for deployment in Europe will **not** look for power on pins 7 & 8. In their usual pursuit of efficiency (coupled with the fact that ISDN was deployed there **after** the North Americans adopted less than efficient practices like PS2 power and the dreaded SPID) the European ISDN community decided to strictly adhere to ISDN specifications and standards using only 4-conductors for premises wiring instead of 6. ISDN ST Line Power Adapters built for use in North America will **not** work on Euro ISDN phone/terminal equipment (you can, however, power Euro ISDN equipment using some NT-1s which do supply PS1 as well as PS2 power). You must use a Euro Line Power Adapter, such as the P1E manufactured by Lion Communications Industries, Ltd., Kent UK. These adapters are designed to supply enough power on the ST signal bus to run multiple devices attached to the same ISDN line. They will also pass the limited 'phantom' power supplied by the network, also known in Europe as Granny Power. Granny Power is intended for emergencies where local power fails, thus rendering the Line Power Adapters useless. The network usually supplies enough power on the signal lines to run at least one or two devices – allowing an ISDN phone to operate under emergency conditions.

8 Line Testing

The Initia ST BRI interface logic can drive 3000 feet of Cat-5 with no more than 6db of loss. If a lower grade wire has taps, splices, etc., it can amount to excessive loss across the length of the cable. Testing at Initia has demonstrated that considerably less than 2000 feet of 24 gauge twisted pair cable which is not Cat-5, can easily produce loss greater than 6db, even with no other impairments (bad copper, splices, taps, etc.).

Similarly, the Initia U-ref BRI interface logic can drive 18,000 feet of Cat-5, also with no more than 6db of loss.

A Transmission Impairment Measurement System (TIMS) test set is required to reliably check for transmission line loss. For ISDN, you need to have a Broadband TIMS set as well. Most TIMS sets are designed for lab use, but are portable (like the HP 4935). There are also a few hand-held battery TIMS units on the market (the CC195 by Critical Communications, for instance). To perform a line loss test correctly you need two of them - one at each end. If you try to do it in a loop-back fashion using a single test set at the near end and some sort of loop-back plug at the far end, it can get real ugly. Theoretically, if the line is good you should see twice the loss as would be measured in one direction (down to the loop and back to the test set). But you have to consider you may have a bad run of wire, producing more loss on one set of signal leads than the other. It is best to run a full duplex test with two test sets, one on each end of the connection.

