# Robbed Bit Signaling in the TSU 120

This document describes robbed bit signaling (RBS) and illustrates how RBS is handled by the TSU 120 built in DSX-1 interface.

In robbed bit signaling, the least significant bit is robbed out of each DS0 in the 6th and 12th frames of the superframe. These bits carry information about the signal state of an analog voice line (on-hook, off-hook, ringing, etc). Since the signaling bits are embedded exclusively to the 6th and 12th frames it is imperative that the bits stay associated with those frames to maintain proper signaling states of analog voice lines.

The ADTRAN TSU 120 is equipped with one built in DSX-1 interface. This interface has settings to enable or disable RBS. For RBS to be passed correctly to the built in DSX-1 interface RBS must be enabled.
The NI and DSX-1 interface are separated in the TSU and initialize at different times. This causes the two interfaces to not have frame sync with one another. When the interfaces initialize the framing is offset by some value.

If robbed bit signaling is used, the signal bits going out (which the PBX will still look for on the 6th and 12th frame) will not match those that came in. The solution is that the incoming signal bits from the network are captured and stored. When the DS0s are handed to the opposite interface, the signal bits are reinserted into the proper frames, overwriting whatever bit was there. Overwriting the data is not a problem for a normal voice link (where the least significant bit can be robbed in the first place) but will cause errors on a data link or a PRI when bits are robbed out of the D-channel. Robbed bit signaling allows the unit to "withhold" signaling bits when the two interfaces are slightly out of sync and reinsert them in the appropriate frame. The following example illustrates this process.

EXAMPLE:

**Although the figures in this example illustrate data being passed in one direction, robbed bit signaling is handled the same when transmitting from the DSX-1 interface to the NI.**

For the following example, framing between the NI and DSX-1 interface is offset by one frame as seen in figure 1. **The offset will vary, it will not always be exactly one frame.**

Figure 1 shows the TSU reading data from frame 5 on the NI and writing to frame 4 on the DSX-1 interface. Data is passed between then NI and DSX-1 interface.

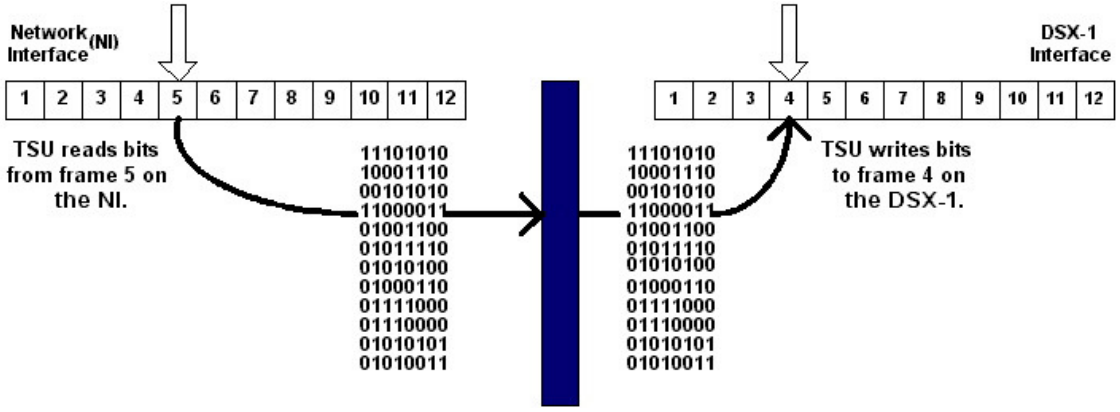

Figure 1  NI and DSX-1 are not framed synced, data is passed between them.

When robbed bit signaling is enabled on the TSU built in DSX-1 interface, RBS bits (8th bit from every DS0 in the 6th and 12th D4 frame) on the NI are stored in a buffer illustrated by figure 2. When RBS is disabled the RBS bits are not buffered but passed through to the other interface.

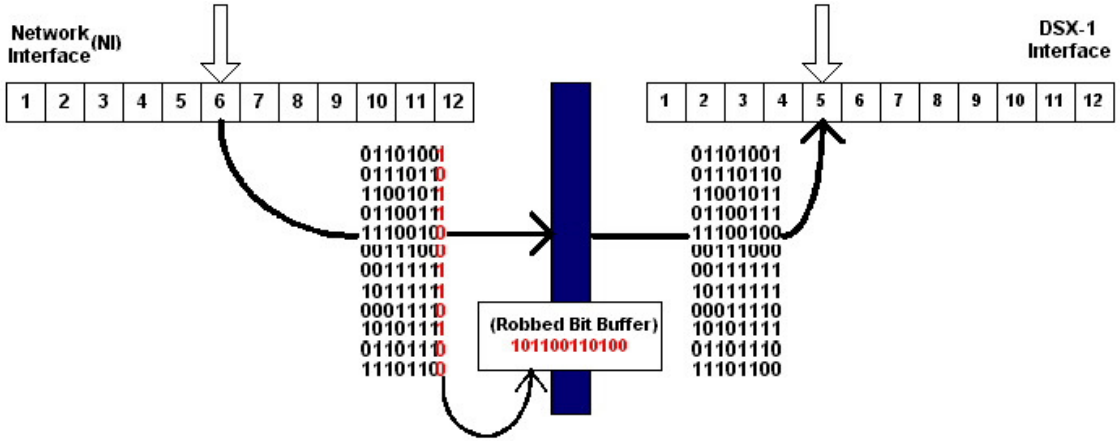


Figure 2  RBS bits are buffered until the DSX interface is on frame 6.

Once the DSX-1 interface is on it's 6th frame the RBS bits are inserted into the 8th bit position of every DS0. Figure 3 shows the robbed bits replace the data bits that were originally in the 8th position. Changes in the voice quality will not be noticed. However, this will cause errors if running data while RBS is enabled.

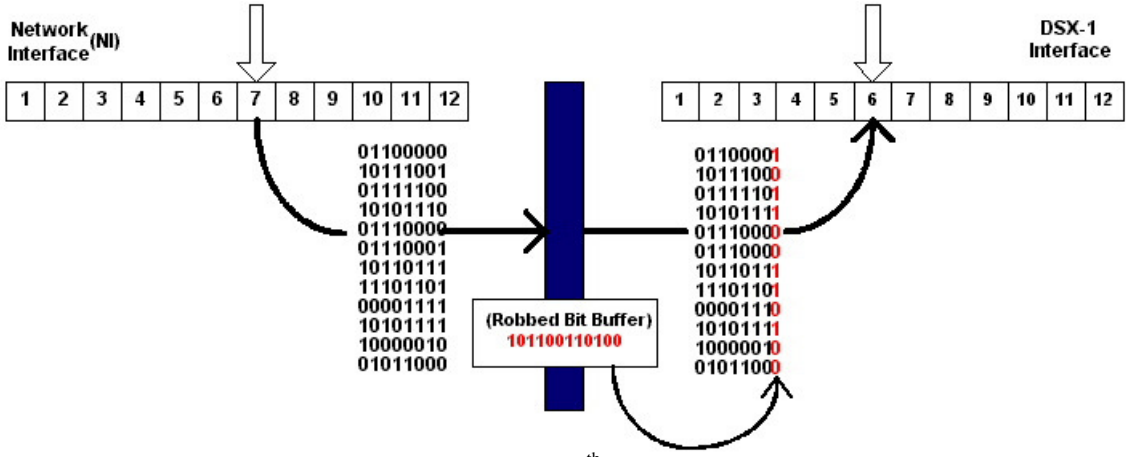


Figure 3  RBS bits overwrite data in the 8th bit position in all DS0s of frame 6.

This process of storing RBS bits in the buffer is ongoing. The TSU stores RBS bits from the 6th and 12th frame and passes those bits between the interfaces. This ensures that the signaling bits are in the correct frame for equipment using robbed bit signaling.

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