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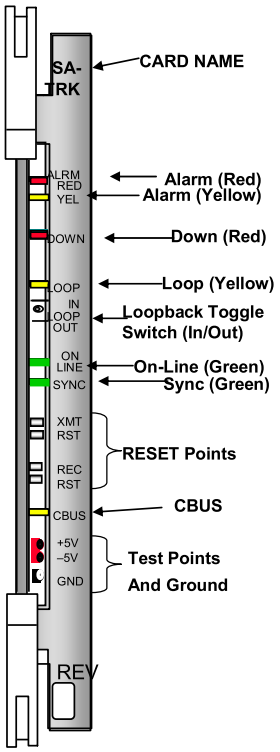
Trunk Module SA-TRK

Symmetric Asymmetric Trunk (SA TRK 530) is used when transmit and receive trunk rates are not same (asymmetric) between nodes on the trunk.

There are no hardware options for SA TRK modules so all parameters for establishing the inter-nodal link must be done through the software operator interface.

Contains EIA530 rear interface card.

Handles data rates from 16kbs-8.448Mbs in P200/400.
Handles data rates from 16kbs-16.384Mbs in P800.



SA-TRK Overhead
Bandwidth is allocated on a trunk module on a per-call basis between communicating nodes across a network. Trunk bandwidth typically consists of a leased line or a satellite link that connects two trunk modules on different nodes. The job of the trunk module is to take the data on the TBus and pack it into time slots on the trunk. Two sources of trunk overhead subtract from the available bandwidth:

- Signaling Channel Link Protocol (SCLP): this traffic is used to learn the health of the network, discover connectivity among nodes, and send messages between nodes.
- Framing: this overhead starts a packet, and includes other information that is specific to the packet being transmitted.

Rear Interface Card
The SA-EIA530 interface card provides the physical connection between the SA-TRK front card and external trunking equipment. It provides data conversion between the SA-TRK front card and a synchronous high-speed serial NRZ data circuit. The SA-EIA530 interface card has no jumpers or switches and all parameters are configured through the Operator Interface. The trunk interface is EIA-530 DTE using a 25-pin female D subminiature (DB-25S) connector.

The elastic buffer, when set to *Buffer*, provides Receive buffering for up to 10ms of peak-to-peak differential delay. This is useful in satellite applications where the peak-to-peak differential Doppler delay may exceed 2ms (the amount provided by the SA-TRK front card when this buffer is *Bypass*). The elastic buffer may be individually enabled for each direction of the SA-TRK link so that it can be used only in the direction it is really needed. The above Figure shows a block diagram of an SA-TRK link and the placement of the elastic buffer in the trunk data path.

Unless the user really needs more than 2 ms of RX buffering, the elastic buffer should not be enabled. One reason is that when the elastic buffer is enabled, RX buffer slips will cause trunk super frame sync losses. This is contrasted with the integral 2ms receive slip buffer on the SA-TRK, which provides “graceful” frame slips. With the internal receive buffer, depending upon whether the incoming data clock (RT) is faster or slower than the Promina clock, a 1ms frame of data will either be repeated or deleted. No frame losses should occur.

Install Card SA-TRK (1)

```
< ins car, c19

*** SLOT N1C19 CONTAINS CARD TYPE SATRK.

DO YOU WANT TO INSTALL CARD N1C19?  [YES]
YES OR NO =

*** INSTALLABLE CARD TYPES ***
[ 0]  TRK            [21]  HSD-2          [42]  E3-TRK
[ 1]  LDCELP12       [22]  TMCP           [43]  VCFAX-24
[ 2]  LDCELP24       [23]  T3-TRK         [44]  VCFAX-12
[ 3]  CX             [24]  QXP            [45]  PX-3
[ 4]  URD            [25]  TK64           [46]  TRK-3
[ 5]  QSD            [26]  I422-TRK       [47]  ECHOX
[ 6]  INTU-560       [27]  QASD           [48]  APX
[ 7]  TRK-2          [28]  HDVC24         [49]  SX-2
[ 8]  HSD            [29]  HDVC12         [50]  PLM
[ 9]  DS-1           [30]  QAVP           [51]  PPM
[10]  USD            [31]  BX             [52]  LDCELP6
[11]  MEM            [32]  SX             [53]  HLC
[12]  QSD-2          [33]  HPC            [54]  PVEC
[13]  TK56           [34]  DS0B           [55]  PVE24
[14]  PRC            [35]  PX             [56]  HINTU
[15]  DS0A           [36]  PX-2           [57]  SCLX
[16]  VC31           [37]  PVAC           [58]  TWC
[17]  VC62           [38]  PVA            [59]  IP-TRK
[18]  DMD            [39]  LS-TRK
[19]  INTU-558       [40]* SATRK
[20]  X50            [41]  PX PLUS

NOTE: '*' MARKS DEFAULT SELECTION.
ENTER CARD TYPE FOR CARD N1C19?  [SATRK]
CARD TYPE =
```

```
*** CONFIGURATION PARAMETERS FOR SATRK CARD N1C19 ***
[ 0]  NEIGHBOR NODE = 0(NONE)
[ 1]  SAT/TERR = TERRESTRIAL
[ 2]  ENCRYPTION = NOT ENCRYPTED
[ 3]  REDUNDANT CARD = **NONE**
[ 6]  ALARM WAIT TIME = 4 SECONDS
[ 7]  ALARM PERCENTAGE = 100 PERCENT
[ 8]  FIBER OPTION = NO
[10]  BER REPORT INTERVAL = 30 MINUTES
[11]  HIBER REPORT THRESHOLD = 10E-4
[14]  AUX ALARM POLARITY = LOW
[15]  CLK REF SELECT: NONE
[16]  LOOP TIMEOUT = 0 SECONDS
[17]  LOGICAL SLOT(S) = 1
[18]  TRANSMIT TRUNK RATE = 1024 KBPS
[19]  RECEIVE TRUNK RATE = 1024 KBPS
[20]  SCLP RATE = 16 KBPS
[21]  CRYPTO SYNC PULSE = 8.0  SECS
[22]  MODIFY I/F CARD TYPE = SA-EIA 530

ENTER PARAMETER INDEX (OR HIT RETURN TO CONTINUE)
PARAMETER INDEX = 0

ENTER NEIGHBOR NODE FOR TRUNK CARD N1C19  [0(NONE)]
NODE ID = n2
```

[0] Neighbor Node

Value is a node ID or *None* (default). A neighbor node in another domain must be identified with the domain ID preceding the node ID. For example, *D15N47* indicates node 47 in domain 15. This parameter identifies the node with which the trunk module communicates. A trunk cannot be activated without a designated neighbor. The Operator Interface provides the default node name (assigned by the operator during node initialization). A node can have up to 64 neighbors.

[1] Sat/Terr

Values are *Satellite* or *Terrestrial* (default). This parameter is a trunk routing attribute that must be configured to match at both ends of the trunk. This attribute is used when routing a call that has its *Routing Options* port parameter set to *Preferred* or *Required* for satellite or terrestrial routing. The port module configurations will include their routing preferences.

[2] Encryption

Values are *Encrypted* or *Not Encrypted* (default). This parameter is a trunk routing attribute that must be configured to match at both ends of the trunk. This attribute is used when routing a call that has its *Routing Options* port parameter set to *Preferred* or *Required* for encryption routing. The port module configurations will include their routing preferences.

[3] Redundant Card
Value is a card ID. The default is *None*. This parameter (only valid for non-switched trunks) specifies the slot number of the backup trunk module. Redundant modules must be cabled together and installed with the same attributes.

[4-5] Not Used

[6] Alarm Wait Time
Value range is *1 – 15* seconds. The default is *4* seconds. When the trunk loses synchronization, this parameter specifies the number of seconds needed for the software to determine whether to take the trunk down (red alarm) and initiate call-reconnect actions. This parameter works in conjunction with the Alarm percentage parameter.

[7] Alarm Percentage
Value range is *0 – 100* (default) percent, and is expressed in 10 percent increments. This parameter determines how many samples (samples are taken in 100-ms intervals) must indicate an alarm condition before the alarm is classed as persistent and the trunk is taken down (a red alarm), initiating call-reconnect actions.

[8] Fiber Option
Values are *Yes* or *No* (default). This parameter is a trunk routing attribute that must be configured to match at both ends of the trunk. This attribute is used when routing a call that has its *Routing Options* port parameter set to *Preferred* or *Required* for fiber routing. The port module configurations will include their routing preferences.

[10] BER Report Interval
Value range is *1 – 60* minutes. The default is *30* minutes. This parameter indicates the frequency of Bit Error Rate (BER) report events.

[11] HIBER Report Threshold
Value range is *10E-3 – 10E-6*. This parameter indicates the error rate threshold at which the High BER event is generated.

[12] Not Used

[13] Not Used

[14] Aux Alarm Polarity
Values are *High* or *Low* (default depends on the card type). High A positive voltage Low Usually a ground potential.

[15] Clock Reference Select
Values are *0, 1,* or *None* (default). This field indicates whether this trunk is used as one of the reference clock sources from which trunk the node receives timing. The trunk that supplies clocking to the node must be identified when that node is installed or modified.

[16] Loop Timeout
Value range is *0* (default) – *7* seconds. This parameter controls the node's response time when it detects a looped-trunk condition. This occurs when an external loop has been placed on a Promina trunk facility, and the Promina detects a looped condition (loopback) on the trunk's SCLP channel. This parameter specifies how long the loopback condition is maintained before affected traffic is rerouted and the trunk restarts.

[17] Logical Slots
Values are *1* (default), *2, 4,* and *8* for the Promina 800, and *1 (default), 2,* and *4* for the Promina 100/200/400 systems. The logical slot selection on the SA-TRK at each end of the trunk link must agree, or the trunk will not come up.

[18] Transmit Trunk Rate
Value range is:

- *16 – 16384 kbps* for Promina 800 nodes
- *16 – 8448 kbps* for Promina 200 and 400 nodes

The value of 8448 kbps allows for connection to an E2 interface and provides 8192 kbps of available bandwidth.

[19] Receive Trunk Rate
Value range is:

- *16 – 16384 kbps* for Promina 800 nodes
- *16 – 8448 kbps* for Promina 200 and 400 nodes

The value of 8448 kbps allows for connection to an E2 interface and provides 8192 kbps of available bandwidth.

[20] SCLP Rate
Values are *8, 16* (default), or *64 kbps*. The SCLP rate at both ends of an SA-TRK must match or the trunk will not come up. The SCLP rate should be selected based on the number of calls the SA-TRK link will be supporting.

[21] Crypto Sync Pulse
Value is *0.2, 0.5, 1, 2, 3, 4, 6,* or *8* (default) seconds. This parameter specifies the period-of-time (in seconds) between SA-TRK resync commands when a loss of synchronization is detected. It is recommended that this parameter be set at *2* or greater to allow cooperative resync of both encryptors. A value greater than *2* may be required when SA-TRKs are connected by multiple satellite hops. A value less than *2* may be desirable on links which require frequent resyncs.
The SA-TRK resync command is a contact closure between the Crypto Common lead (pin 4) and the Open-when-in-sync lead (pin 19) of the SA-EIA530 interface. The closure duration is approximately 50 ms. The encryptor Resync and Timeout straps must be configured properly to recognize the closure. The encryptor Red Resync strap must be configured for Contact Closure. The Timeout strap setting works at different values, depending on the SA-TRK rate.

[22] Modify I/F Card Type
Value is *SA-EIA 530* (currently, this is the only interface card supported). Selecting this parameter displays a submenu of interface card parameters. The parameters displayed are particular to a specific interface card.

Install Card SA-TRK (2)

SA-TRK Rear Interface Card Parameters

*** I/F Config Parameters for SATRK card N90C16 ***

[1] External Clock Select = **INT**
[2] Send Scrambler Bypass = BYPASS
[3] Rx Descrambler Bypass = BYPASS
[4] Elastic Buffer Bypass = BYPASS
[5] Input Impedance = 120 Ohms
[6] RT/ST Reference Source = **RT**
[7] Conditioned Di-Phase = DISABLED
[8] Transmit Data Phase = Normal

[1] External Clock Select
Value is *Int* (default) or *Ext.* When set to internal (*Int*), a synthesized clock (derived from the Promina clock) is generated at the rate configured by the *Transmit Trunk Rate* parameter. This clock is used to clock out send data (SD) and is sent out on the terminal timing (TT) lead. When set to external (*Ext*), the clock is received on the send timing (ST) inputs from the DCE and used to clock the transmit data (SD). This clock is also regenerated on the terminal timing (TT) lead so that the clock travels along with the transmit data (SD). Jitter is not a factor in this configuration.

[2] Send Scrambler Bypass
Value is *Bypass* (default) or *Scramble*. If the scrambler is enabled on one end of an SA-TRK link, the descrambler must be enabled on the remote end SA-TRK, or the trunks will not synchronize. When set to *Scramble*, a trunk aggregate scrambler (32x32 bit spiral data interleaver) is enabled, which enhances SA-TRK performance in environments where block errors are probable. The scrambling function is performed on outgoing transmit trunk data only. The only penalty for invoking the scrambler is the delay incurred because of the 32x32 bit buffer, which is used to perform the scrambling function (1024 bits, which is 32 milliseconds @ 32 kbps). The formula for calculating this delay is: Scrambler Delay (in ms) = 1024/Trunk rate (in kbps).

[3] Rx Descrambler Bypass

Value is *Bypass* (default) or *Scramble*. If the scrambler is enabled on one end of an SA-TRK link, the descrambler must be enabled on the remote end SA-TRK, or the trunks will not synchronize. When set to *Scramble*, a trunk aggregate descrambler (32x32 bit spiral data deinterleaver) is enabled, which enhances SA-TRK performance in environments where block errors are probable. The descrambling function is performed on incoming receive trunk data only. The only penalty for invoking the descrambler is the delay incurred because of the 32x32 bit buffer, which is used to perform the descrambling function (1024 bits, which is 32 milliseconds @ 32 kbps).

[4] Elastic Buffer Bypass

Value is *Bypass* (default) or *Buffer*. The elastic buffer, when set to *Buffer*, provides Receive buffering for up to 10ms of peak-to-peak differential delay. This is useful in satellite applications where the peak-to-peak differential Doppler delay may exceed 2ms (the amount provided by the SA-TRK front card when this buffer is *Bypass*). An enabled elastic buffer incurs an additional 10 ms (average) delay in the Receive data path. The Transmit data path is not affected. The elastic buffer may be individually enabled for each direction of the SA-TRK link so that it can be used only in the direction it is really needed. Unless the user really needs more than 2 ms of RX buffering, the elastic buffer should not be enabled. One reason is that when the elastic buffer is enabled, RX buffer slips will cause trunk super frame sync losses. This is contrasted with the integral 2ms receive slip buffer on the SA-TRK, which provides “graceful” frame slips. With the internal receive buffer, depending upon whether the incoming data clock (RT) is faster or slower than the Promina clock, a 1ms frame of data will either be repeated or deleted. No frame losses should occur.

[5] Input Impedance

Value is *78* or *120* (default) ohms. This value is available to configure the impedance of all differential clock and data inputs at the EIA-530 trunk interface. This parameter should be set to match the characteristic impedance of the cable to minimize signal reflections.

[6] RT/ST Reference Source

Value is *RT* (default) or *ST*. This option sets the source of the reference clock. The reference clock is used to synchronize the local Promina node (into which the SA-TRK is plugged) to an incoming clock. This reference source can be either another Promina node or an external clock source (black station clock) and is used to synchronize the Promina network. Sources of reference clock can be either the send timing (ST) or receive timing (RT) lead of the SA-EIA530 trunk interface. When *ST* is selected for a reference source, the parameter *External Clock Select* must be set to *Ext*, or the node will try to synchronize to itself and cause a clock loop.

[7] Conditioned Di-phase

Value is *Disabled* (default) or *Enabled*. When *Enabled* is selected, conditioned diphase encoding/decoding is performed on the clock (TT/RT) and data (SD/RD) signals, this special-purpose coding scheme is available on the Revision B interface.

[8] Transmit Data Phase

Value is *Normal* (default) or *180 Degrees*. When *180 Degrees* is selected, the outgoing data signal (SD) is delayed for 1/2 of a clock period, to help compensate for long cable lengths in applications where terminal timing (TT) cannot be used.

Install Card SA-TRK (3)

```
*** CONFIGURATION PARAMETERS FOR SATRK CARD N1C19 ***
[ 0]  NEIGHBOR NODE = 2(NODE 2)
[ 1]  SAT/TERR = TERRESTRIAL
[ 2]  ENCRYPTION = NOT ENCRYPTED
[ 3]  REDUNDANT CARD = **NONE**
[ 6]  ALARM WAIT TIME = 4 SECONDS
[ 7]  ALARM PERCENTAGE = 100 PERCENT
[ 8]  FIBER OPTION = NO
[10]  BER REPORT INTERVAL = 30 MINUTES
[11]  HIBER REPORT THRESHOLD = 10E-4
[14]  AUX ALARM POLARITY = LOW
[15]  CLK REF SELECT: NONE
[16]  LOOP TIMEOUT = 0 SECONDS
[17]  LOGICAL SLOT(S) = 1
[18]  TRANSMIT TRUNK RATE = 1024 KBPS
[19]  RECEIVE TRUNK RATE = 1024 KBPS
[20]  SCLP RATE = 16 KBPS
[21]  CRYPTO SYNC PULSE = 8.0  SECS
[22]  MODIFY I/F CARD TYPE = SA-EIA 530

ARE ALL PARAMETERS CORRECT?  [YES]
YES OR NO =

*** TBUS BW LESS THAN TRUNK BW. TBUS TOO SMALL TO FEED
TRUNK BW.

*** SATRK CARD N1C19 HAS BEEN INSTALLED.
```

```
*** SATRK CARD N1C19 CONFIGURATION ***
   TRUNK CPU ID: NONE        SCLP CPU ID: NONE     SLOT TYPE: SATRK
(REV K)
   DB STATUS: DISABLED *     SATELLITE: NO         NGBR: N2(NODE 2)
   SERVICE STATUS: DOWN *    ENCRYPTED: NO         RDNT TRUNK: NONE
   BLOCKED: NO               CLK REF: NONE         FIBER: NO
   BER INTERVAL: 30 MINS     HIBER THRSHLD: 10E-4  OUTAGE PARMS: 4
SEC/100
   LOGICAL SLOT(S): 1        TXTRKRATE: 8192 KBPS  RXTRKRATE: 8192
KBPS
   SCLP RATE: 16 KBPS        CRYPTO SYNC: 8.0  SECS
                                AUX ALARM POLARITY: LOW
                                LOOP TIMEOUT: 0 SEC
   I/F IS INSTALLED IN DATABASE AS SA-EIA 530      F/W REV: TX: 0 RX: 0
   EXT CLK SEL: INT          TX SCRMBLR: BYPASS    RX DESCRMBLR:
BYPASS
   ELASTIC BUFF: BYPASS      IMPEDANCE: 120 OHMS   REF. SRC: RT
   COND DIPHASE: DISABLED    TX DATA PHASE: NORMAL
*** HIT RETURN TO CONTINUE (ESCAPE TO QUIT) ***


*** SATRK CARD N1C19 INTERFACE INFORMATION ***
   (UNKNOWN I/F TYPE (CARD DISABLED))
DO YOU WANT TO ACTIVATE CARD N1C19?  [YES]
YES OR NO =

*** SATRK CARD N1C19 HAS BEEN ENABLED.

*** SATRK CARD N1C19 HAS BEEN ACTIVATED.


*** COMMAND COMPLETE ***
```

Choose Option 22 to modify Rear Interface Card Parameters.

Query Card SA-TRK

```
                    < q car, c20

ENTER DISPLAY MODE (DETAIL OR SUMMARY)  [D]
DISPLAY MODE (D OR S) =

*** SATRK CARD N1C20 CONFIGURATION ***
   TRUNK CPU ID: 11        SCLP CPU ID: 11      SLOT TYPE: SATRK (REV K)
   DB STATUS: ACTIVE       SATELLITE: NO        NGBR: N12(NODE12)
   SERVICE STATUS: UP      ENCRYPTED: NO        RDNT TRUNK: NONE
   BLOCKED: NO             CLK REF: NONE        FIBER: NO
   BER INTERVAL: 30 MINS    HIBER THRSHLD: 10E-4  OUTAGE PARMS: 4 SEC/100
   LOGICAL SLOT(S): 4      TXTRKRATE: 8192 KBPS  RXTRKRATE: 8192 KBPS
   SCLP RATE: 16 KBPS      CRYPTO SYNC: 8.0  SECS
                                AUX ALARM POLARITY: LOW
   STATE: ACTIVE           SUBSTATE: GET NEXT MSG
   TRKBWRESERVED: 0        TRKBWAVAIL: 7652000   TRKBWUSE: 512000/2 CALLS
   T-BUSBWAVAIL: 7664
   SCLP STATE: UP  FOR 4676 SECONDS TO N12C18.
                                LOOP TIMEOUT: 0 SEC
   I/F IS INSTALLED IN DATABASE AS SA-EIA 530     F/W REV: TX: 40 RX: 40
   EXT CLK SEL: INT        TX SCRMBLR: BYPASS    RX DESCRMBLR: BYPASS
   ELASTIC BUFF: BYPASS     IMPEDANCE: 120 OHMS   REF. SRC: RT
   COND DIPHASE: DISABLED   TX DATA PHASE: NORMAL
*** HIT RETURN TO CONTINUE (ESCAPE TO QUIT) ***

*** SATRK CARD N1C20 INTERFACE INFORMATION ***
   I/F TYPE: SA-EIA 530     TX BW: 8192 KBPS     RX BW: 8192 KBPS
   EXT CLK SEL: INT        REF. SRC: RT         IMPEDANCE 120 OHMS
   TX SCRMBLR: BYPASS       RX DESCRMBLR: BYPASS  ELASTIC BUFF: BYPASS
   COND DIPHASE: DISABLED   TX DATA PHASE: NORMAL
   STATUS: ONLINE
   ALARMS:                 LOOPS:               DTR: HI
   TX INTERRUPTS:
   RX INTERRUPTS:

*** SATRK CARD N1C20 ERROR PERFORMANCE ***
            CURRENT INTERVAL (18 MINS)    LAST BER
REPORT INTERVAL
   BIT ERRORS:      0 OUT OF  1328064 BITS        0 OUT OF
2211816 BITS
   SCLP ERRORS:     0 OUT OF      737 SU'S        0 OUT OF
1169 SU'S
   FRAME SLIPS:                0 TOTAL                    0 TOTAL
*** HIT RETURN TO CONTINUE (ESCAPE TO QUIT) ***


*** COMMAND COMPLETE ***
```

Highlighted above are certain things to look for when querying this card, this query will aid you in troubleshooting.

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