CALCnet² BY KERM MARTIAN

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Protocol Whitepaper

Preamble

CALCnet² is a low-level networking protocol for handheld graphing devices. It allows up to 254 devices on each token ring network node, and does not require a server. It also supports external resource connections such as file servers and intranet connections. CALCnet² is implemented as a bidirectional link protocol that relies upon cascading check-ins to prevent network disintegration. It is designed to work reliably within the low processor speeds of handheld graphing devices without noticeably slowing the device.

Byte-Level Protocol

CALCnet² uses a 3 byte packet to send each data byte over the network, as follows:

```
Bit  01234567P  01234567P  01234567P
Byte 1------->  2------->  3------->
Use  Sender ID  Target ID  Data Byte
```

The first byte contains the ID byte from 0x00 to 0xFE of the calculator sending the packet. If the calculator does not yet have an ID, it sends an ID of 0x00; otherwise the ID is from 0x01 to 0xFE. The second byte contains the target ID; it is uses the same format as the sender ID with one exception: to send to the entire network, the target ID is 0xFF. The final byte is the actual data byte. The first 16 data byte types are reserved for use by the TriLlIon overlay on the CALCnet² protocol. Any program can use the CALCnet² protocol to transmit and receive data once its network connection has been initialized. The CALCnet² protocol is used to open a connection, TriLlIon initializes the data session, and then direct data exchange can be carried out over the network between any two devices.

Data Byte Types

0x01 Request for ID

The new device first sends 0x00, 0xFF, 0x01. If there is no response, the device assigns itself an ID of 0x01. IF there are other devices present, device ID 0x01 intializes the cascading check-in sequence. After the last device on the network sends its check-in, and 5ms have elapsed, the last device sends 0xID, 0x00, 0x03; 0xID,0x00,0xID+1 to assign the new device the highest ID in the network. If the last device has ID 0xFE, it sends 0xID, 0x00, 0x04 instead, indicating that the network is full.

0x02 Cascading Check-In: Device Present
Always initiated by device ID 0x01 or by an 0x01 request from a new device. If any device fails to respond, and there is a device with a higher ID, the unresponsive device is booted and the device above it sends 0xID,0xFF,0x05; device 0x01 then restarts the 0x02 sequence.

0x03 Issue New ID
Issues a new ID tp a new device. Always given by the device with the highest ID, followed by a packet with the new ID byte.

0x04 Full Network
Sent in response to the 0x01 sequence if 254 devices are already on the network. Always sent by ID 0xFE.

0x05 Decrement IDs
Sent if any device fails to respond to the 0x02 sequence. Only affects devices with IDs greater than that of the sending device. It is also sent if the device sending it is disconnecting from the network.

0x06 Terminate Network
This security feature can only be sent by device ID 0x01 and immediately terminates the entire network.

0x07 Ping Resource
Followed by a packet with the resource type ID. If a resource is attempting to join a network, it must send this first; if another resource responds 0xID, 0xSender, 0x08; 0xID, 0xSender, 0xResource, then the new resource is forbidden to join as a resource.

0x08 Resource Present
Sent in response to a resource query (0x07), followed by a packet with the resource type.

0x09 Request Resource
Sent to entire network (0xFF). Followed by a packet with the resource type; the resource will respond 0x0A or 0x0B (see below). Resources should only accept one session at a time.

0x0A Accept Session
0x0B Reject Session
0x0C Request Data Exchange
The target responds with 0x0A or 0x0B.