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S. Waldbusser
Carnegie Mellon University

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Token Ring Extensions to the Remote Network Monitoring MIB

Status of this Memo

This RFC specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

This memo defines extensions to the Remote Network Monitoring MIB for managing 802.5 Token Ring networks.

The Remote Network Monitoring MIB, RFC 1271, defines a framework for remote monitoring functions implemented on a network probe. That MIB defines objects broken down into nine functional groups. Some of those functional groups, the statistics and the history groups, have a view of the data-link layer that is specific to the media type and require specific objects to be defined for each media type. RFC 1271 defined those specific objects necessary for Ethernet. This companion memo defines those specific objects necessary for Token Ring LANs.

In addition, this memo defines some additional monitoring functions specifically for Token Ring. These are defined in the Ring Station Group, the Ring Station Order Group, the Ring Station Configuration Group, and the Source Routing Statistics Group.

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1. The Network Management Framework

The Internet-standard Network Management Framework consists of three components. They are:

STD 16, RFC 1155 [1] which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. STD 16, RFC 1212 [2] defines a more concise description mechanism, which is wholly consistent with the SMI.

STD 17, RFC 1213 [3] which defines MIB-II, the core set of managed objects for the Internet suite of protocols.

STD 15, RFC 1157 [4] which defines the SNMP, the protocol used for network access to managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Within a given MIB module, objects are defined using STD 16, RFC 1212's OBJECT-TYPE macro. At a minimum, each object has a name, a syntax, an access-level, and an implementation-status.

The name is an object identifier, an administratively assigned name, which specifies an object type. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the object descriptor, to also refer to the object type.

The syntax of an object type defines the abstract data structure corresponding to that object type. The ASN.1[5] language is used for this purpose. However, STD 16, RFC 1155 purposely restricts the ASN.1 constructs which may be used. These restrictions are explicitly made for simplicity.

The access-level of an object type defines whether it makes "protocol sense" to read and/or write the value of an instance of the object type. (This access-level is independent of any administrative authorization policy.)

The implementation-status of an object type indicates whether the object is mandatory, optional, obsolete, or deprecated.

2. Guidelines for implementing RFC1271 objects on a Token Ring network

Wherever a MacAddress is to be used in this MIB the source routing bit is stripped off. The resulting address will be consistently valid for all packets sent by a particular node.

2.1. Host Group

Only Token Ring isolating errors will increment the error counter for a particular hostEntry. The isolating errors are: LineErrors, BurstErrors, ACErrors, InternalErrors, and AbortErrors. ACErrors will increment the error counter only for the nearest upstream neighbor of the station reporting the error. LineErrors and BurstErrors will increment the error counters for the station reporting the error and its neighbor upstream neighbor. InternalErrors and AbortErrors will increment the error counter for the station reporting the error only. In addition, congestionErrors will also be counted for each hostEntry. These errors will be incremented in the host entry of the station that reports the errors in an error report frame.

The hostOutPkts and hostOutOctets counters shall not be incremented for packets with errors.

2.2. Matrix Group

Error counters are never incremented.

2.3. Filter Group

The following conditions make up the status bitmask for token ring networks:

bit #	Error
3	First packet after some packets were dropped
4	Packet with the Frame Copied Bit set
5	Packet with the Address Recognized Bit set

For the purpose of the packet match algorithm, the filters assume a 32 byte RIF field. Thus, when matching, the filter is compared to the packet starting at the AC byte of the packet, until the end of the RIF field; then the unused RIF bytes in the filter are skipped and matching proceeds from that point. Any filter "care" bits in the RIF that don't correspond to bytes in the input packet will cause the filter to fail.

2.4. Other comments

Because soft error report packets may be sent with assured delivery, some errors may be accidently reported twice on devices that perform the RMON function promiscuously.

3. Overview of the RMON Token Ring Extensions MIB

The Remote Network Monitoring MIB, RFC 1271, defines a framework for remote monitoring functions implemented on a network probe. That MIB defines objects broken down into nine functional groups. Some of those functional groups, the statistics and the history groups, have a view of the data-link layer that is specific to the media type and require specific objects to be defined for each media type. RFC 1271 defined those specific objects necessary for Ethernet. This MIB defines contains four groups that define those specific objects necessary for Token Ring LANs.

In addition, this memo defines some additional monitoring functions specifically for Token Ring. These are defined in the Ring Station Group, the Ring Station Order Group, the Ring Station Configuration Group, and the Source Routing Statistics Group.

3.1. The Token Ring Statistics Groups

The Token Ring statistics groups contain current utilization and error statistics. The statistics are broken down into two groups, the Token Ring Mac-Layer Statistics Group and the Token Ring Promiscuous Statistics Group. The Token Ring Mac-Layer Statistics Group collects information from Mac Layer, including error reports for the ring and ring utilization of the Mac Layer. The Token Ring Promiscuous Statistics Group collects utilization statistics from data packets collected promiscuously.

3.2. The Token Ring History Groups

The Token Ring History Groups contain historical utilization and error statistics. The statistics are broken down into two groups, the Token Ring Mac-Layer History Group and the Token Ring Promiscuous History Group. The Token Ring Mac-Layer History Group collects information from Mac Layer, including error reports for the ring and ring utilization of the Mac Layer. The Token Ring Promiscuous History Group collects utilization statistics from data packets collected promiscuously.

3.3. The Token Ring Ring Station Group

The Token Ring Ring Station Group contains statistics and status information associated with each Token Ring station on the local ring. In addition, this group provides status information for each ring being monitored.

3.4. The Token Ring Ring Station Order Group

The Token Ring Ring Station Order Group provides the order of the stations on monitored rings.

3.5. The Token Ring Ring Station Config Group

The Token Ring Ring Station Config Group manages token ring stations through active means. Any station on a monitored ring may be removed or have configuration information downloaded from it.

3.6. The Token Ring Source Routing Group

The Token Ring Source Routing Group contains utilization statistics derived from source routing information optionally present in token ring packets.

4. Terminology

The 802.5 specification [7] defines the term "good frame" as a frame that is bounded by a valid SD and ED, is an integral number of octets in length, is composed of only 0 and 1 bits between the SD and the ED, has the FF bits of the GC field equal to 00 or 01, has a valid FCS, and has a minimum of 18 octets between the SD and the ED. This document will use the term "good frame" in the same manner.

5. Definitions

```
        TOKEN-RING-RMON-MIB DEFINITIONS ::= BEGIN

        IMPORTS
            Counter, TimeTicks          FROM RFC1155-SMI
            OBJECT-TYPE                 FROM RFC-1212
            OwnerString, EntryStatus,   -- Textual Conventions
            rmon, statistics, history
                                        FROM RFC1271-MIB;


           -- All representations of MAC addresses in this MIB
           -- Module use, as a textual convention (i.e. this
           -- convention does not affect their encoding), the
           -- data type:

           MacAddress ::= OCTET STRING (SIZE (6)) -- a 6 octet
                                                  -- address in
                                                  -- the "canonical"
                                                  -- order
           -- defined by IEEE 802.1a, i.e., as if it were
           -- transmitted least significant bit first, even though
           -- 802.5 (in contrast to other 802.x protocols) requires
           -- MAC addresses to be transmitted most significant bit
           -- first.

            TimeInterval ::= INTEGER
            -- A period of time, measured in units of 0.01 seconds.

        --  This MIB module uses the extended OBJECT-TYPE macro as
        --  defined in [2].

        --  Token Ring Remote Network Monitoring MIB

            tokenRing             OBJECT IDENTIFIER ::= { rmon 10 }


        -- The Token Ring Mac-Layer Statistics Group
        --
        -- Implementation of this group is optional

        tokenRingMLStatsTable OBJECT-TYPE
            SYNTAX SEQUENCE OF TokenRingMLStatsEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A list of Mac-Layer Token Ring statistics
```

```
                entries."
        ::= { statistics 2 }

    tokenRingMLStatsEntry OBJECT-TYPE
        SYNTAX TokenRingMLStatsEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A collection of Mac-Layer statistics kept for a
                particular Token Ring interface."
        INDEX { tokenRingMLStatsIndex }
        ::= { tokenRingMLStatsTable 1 }

    -- As an example, an instance of the
    -- tokenRingMLStatsMacOctets object
    -- might be named tokenRingMLStatsMacOctets.1

    TokenRingMLStatsEntry ::= SEQUENCE {
        tokenRingMLStatsIndex                   INTEGER,
        tokenRingMLStatsDataSource          OBJECT IDENTIFIER,
        tokenRingMLStatsDropEvents              Counter,
        tokenRingMLStatsMacOctets               Counter,
        tokenRingMLStatsMacPkts                 Counter,
        tokenRingMLStatsRingPurgeEvents         Counter,
        tokenRingMLStatsRingPurgePkts           Counter,
        tokenRingMLStatsBeaconEvents            Counter,
        tokenRingMLStatsBeaconTime              TimeInterval,
        tokenRingMLStatsBeaconPkts              Counter,
        tokenRingMLStatsClaimTokenEvents        Counter,
        tokenRingMLStatsClaimTokenPkts          Counter,
        tokenRingMLStatsNAUNChanges             Counter,
        tokenRingMLStatsLineErrors              Counter,
        tokenRingMLStatsInternalErrors          Counter,
        tokenRingMLStatsBurstErrors             Counter,
        tokenRingMLStatsACErrors                Counter,
        tokenRingMLStatsAbortErrors             Counter,
        tokenRingMLStatsLostFrameErrors         Counter,
        tokenRingMLStatsCongestionErrors        Counter,
        tokenRingMLStatsFrameCopiedErrors       Counter,
        tokenRingMLStatsFrequencyErrors         Counter,
        tokenRingMLStatsTokenErrors             Counter,
        tokenRingMLStatsSoftErrorReports        Counter,
        tokenRingMLStatsRingPollEvents          Counter,
        tokenRingMLStatsOwner                   OwnerString,
        tokenRingMLStatsStatus                  EntryStatus
    }
```

```
        tokenRingMLStatsIndex OBJECT-TYPE
            SYNTAX INTEGER (1..65535)
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of this object uniquely identifies this
                    tokenRingMLStats entry."
            ::= { tokenRingMLStatsEntry 1 }

        tokenRingMLStatsDataSource OBJECT-TYPE
            SYNTAX OBJECT IDENTIFIER
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "This object identifies the source of the data
                    that this tokenRingMLStats entry is configured to
                    analyze.  This source can be any tokenRing
                    interface on this device.  In order to identify a
                    particular interface, this object shall identify
                    the instance of the ifIndex object, defined in
                    MIB-II [3], for the desired interface.  For
                    example, if an entry were to receive data from
                    interface #1, this object would be set to
                    ifIndex.1.

                    The statistics in this group reflect all error
                    reports on the local network segment attached to
                    the identified interface.

                    This object may not be modified if the associated
                    tokenRingMLStatsStatus object is equal to
                    valid(1)."
            ::= { tokenRingMLStatsEntry 2 }

        tokenRingMLStatsDropEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of events in which packets were
                    dropped by the probe due to lack of resources.
                    Note that this number is not necessarily the
                    number of packets dropped; it is just the number
                    of times this condition has been detected.  This
                    value is the same as the corresponding
                    tokenRingPStatsDropEvents."
            ::= { tokenRingMLStatsEntry 3 }
```

```
        tokenRingMLStatsMacOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of octets of data in MAC packets
                    (excluding those that were not good frames)
                    received on the network (excluding framing bits
                    but including FCS octets)."
            ::= { tokenRingMLStatsEntry 4 }

        tokenRingMLStatsMacPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of MAC packets (excluding
                    packets that were not good frames) received."
            ::= { tokenRingMLStatsEntry 5 }

        tokenRingMLStatsRingPurgeEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of times that the ring enters
                    the ring purge state from normal ring state.  The
                    ring purge state that comes in response to the
                    claim token or beacon state is not counted."
            ::= { tokenRingMLStatsEntry 6 }

        tokenRingMLStatsRingPurgePkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of ring purge MAC packets
                    detected by probe."
            ::= { tokenRingMLStatsEntry 7 }

        tokenRingMLStatsBeaconEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of times that the ring enters a
                    beaconing state (beaconFrameStreamingState,
                    beaconBitStreamingState,
```

```
                beaconSetRecoveryModeState, or
                beaconRingSignalLossState) from a non-beaconing
                state.  Note that a change of the source address
                of the beacon packet does not constitute a new
                beacon event."
        ::= { tokenRingMLStatsEntry 8 }

    tokenRingMLStatsBeaconTime OBJECT-TYPE
        SYNTAX TimeInterval
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total amount of time that the ring has been
                in the beaconing state."
        ::= { tokenRingMLStatsEntry 9 }

    tokenRingMLStatsBeaconPkts OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of beacon MAC packets detected
                by the probe."
        ::= { tokenRingMLStatsEntry 10 }

    tokenRingMLStatsClaimTokenEvents OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of times that the ring enters
                the claim token state from normal ring state or
                ring purge state.  The claim token state that
                comes in response to a beacon state is not
                counted."
        ::= { tokenRingMLStatsEntry 11 }

    tokenRingMLStatsClaimTokenPkts OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of claim token MAC packets
                detected by the probe."
        ::= { tokenRingMLStatsEntry 12 }
```

```
        tokenRingMLStatsNAUNChanges OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of NAUN changes detected by the
                    probe."
            ::= { tokenRingMLStatsEntry 13 }

        tokenRingMLStatsLineErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of line errors reported in error
                    reporting packets detected by the probe."
            ::= { tokenRingMLStatsEntry 14 }

        tokenRingMLStatsInternalErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of adapter internal errors
                    reported in error reporting packets detected by
                    the probe."
            ::= { tokenRingMLStatsEntry 15 }

        tokenRingMLStatsBurstErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of burst errors reported in
                    error reporting packets detected by the probe."
            ::= { tokenRingMLStatsEntry 16 }

        tokenRingMLStatsACErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of AC (Address Copied)  errors
                    reported in error reporting packets detected by
                    the probe."
            ::= { tokenRingMLStatsEntry 17 }
```

```
        tokenRingMLStatsAbortErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of abort delimiters reported in
                    error reporting packets detected by the probe."
            ::= { tokenRingMLStatsEntry 18 }

        tokenRingMLStatsLostFrameErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of lost frame errors reported in
                    error reporting packets detected by the probe."
            ::= { tokenRingMLStatsEntry 19 }

        tokenRingMLStatsCongestionErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of receive congestion errors
                    reported in error reporting packets detected by
                    the probe."
            ::= { tokenRingMLStatsEntry 20 }

        tokenRingMLStatsFrameCopiedErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frame copied errors reported
                    in error reporting packets detected by the probe."
            ::= { tokenRingMLStatsEntry 21 }

        tokenRingMLStatsFrequencyErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frequency errors reported in
                    error reporting packets detected by the probe."
            ::= { tokenRingMLStatsEntry 22 }
```

```
        tokenRingMLStatsTokenErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of token errors reported in
                    error reporting packets detected by the probe."
            ::= { tokenRingMLStatsEntry 23 }

        tokenRingMLStatsSoftErrorReports OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of soft error report frames
                    detected by the probe."
            ::= { tokenRingMLStatsEntry 24 }

        tokenRingMLStatsRingPollEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of ring poll events detected by
                    the probe (i.e. the number of ring polls initiated
                    by the active monitor that were detected)."
            ::= { tokenRingMLStatsEntry 25 }

        tokenRingMLStatsOwner OBJECT-TYPE
            SYNTAX OwnerString
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The entity that configured this entry and is
                    therefore using the resources assigned to it."
            ::= { tokenRingMLStatsEntry 26 }

        tokenRingMLStatsStatus OBJECT-TYPE
            SYNTAX EntryStatus
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The status of this tokenRingMLStats entry."
            ::= { tokenRingMLStatsEntry 27 }
```

```
        -- The Token Ring Promiscuous Statistics Group
        --
        -- Implementation of this group is optional

        tokenRingPStatsTable OBJECT-TYPE
            SYNTAX SEQUENCE OF TokenRingPStatsEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A list of promiscuous Token Ring statistics
                    entries."
            ::= { statistics 3 }

        tokenRingPStatsEntry OBJECT-TYPE
            SYNTAX TokenRingPStatsEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A collection of promiscuous statistics kept for
                    non-MAC packets on a particular Token Ring
                    interface."
            INDEX { tokenRingPStatsIndex }
            ::= { tokenRingPStatsTable 1 }

        -- As an example, an instance of the
        -- tokenRingPStatsDataOctets object
        -- might be named tokenRingPStatsDataOctets.1

        TokenRingPStatsEntry ::= SEQUENCE {
            tokenRingPStatsIndex                          INTEGER,
            tokenRingPStatsDataSource                OBJECT IDENTIFIER,
            tokenRingPStatsDropEvents                     Counter,
            tokenRingPStatsDataOctets                     Counter,
            tokenRingPStatsDataPkts                       Counter,
            tokenRingPStatsDataBroadcastPkts              Counter,
            tokenRingPStatsDataMulticastPkts              Counter,
            tokenRingPStatsDataPkts18to63Octets           Counter,
            tokenRingPStatsDataPkts64to127Octets          Counter,
            tokenRingPStatsDataPkts128to255Octets         Counter,
            tokenRingPStatsDataPkts256to511Octets         Counter,
            tokenRingPStatsDataPkts512to1023Octets        Counter,
            tokenRingPStatsDataPkts1024to2047Octets       Counter,
            tokenRingPStatsDataPkts2048to4095Octets       Counter,
            tokenRingPStatsDataPkts4096to8191Octets       Counter,
            tokenRingPStatsDataPkts8192to18000Octets      Counter,
            tokenRingPStatsDataPktsGreaterThan18000Octets Counter,
            tokenRingPStatsOwner                          OwnerString,
            tokenRingPStatsStatus                         EntryStatus
```

```
        }

        tokenRingPStatsIndex OBJECT-TYPE
            SYNTAX INTEGER (1..65535)
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of this object uniquely identifies this
                    tokenRingPStats entry."
            ::= { tokenRingPStatsEntry 1 }

        tokenRingPStatsDataSource OBJECT-TYPE
            SYNTAX OBJECT IDENTIFIER
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "This object identifies the source of the data
                    that this tokenRingPStats entry is configured to
                    analyze.  This source can be any tokenRing
                    interface on this device.  In order to identify a
                    particular interface, this object shall identify
                    the instance of the ifIndex object, defined in
                    MIB-II [3], for the desired interface.  For
                    example, if an entry were to receive data from
                    interface #1, this object would be set to
                    ifIndex.1.

                    The statistics in this group reflect all non-MAC
                    packets on the local network segment attached to
                    the identified interface.

                    This object may not be modified if the associated
                    tokenRingPStatsStatus object is equal to
                    valid(1)."
            ::= { tokenRingPStatsEntry 2 }

        tokenRingPStatsDropEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of events in which packets were
                    dropped by the probe due to lack of resources.
                    Note that this number is not necessarily the
                    number of packets dropped; it is just the number
                    of times this condition has been detected.  This
                    value is the same as the corresponding
                    tokenRingMLStatsDropEvents"
```

```
            ::= { tokenRingPStatsEntry 3 }

        tokenRingPStatsDataOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of octets of data in good frames
                    received on the network (excluding framing bits
                    but including FCS octets) in non-MAC packets."
            ::= { tokenRingPStatsEntry 4 }

        tokenRingPStatsDataPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of non-MAC packets in good
                    frames.  received."
            ::= { tokenRingPStatsEntry 5 }

        tokenRingPStatsDataBroadcastPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were directed to an LLC broadcast address
                    (0xFFFFFFFFFFFF or 0xC000FFFFFFFF)."
            ::= { tokenRingPStatsEntry 6 }

        tokenRingPStatsDataMulticastPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were directed to a local or global multicast
                    or functional address.  Note that this number does
                    not include packets directed to the broadcast
                    address."
            ::= { tokenRingPStatsEntry 7 }

        tokenRingPStatsDataPkts18to63Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
```

```
                    "The total number of good non-MAC frames received
                    that were between 18 and 63 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 8 }

        tokenRingPStatsDataPkts64to127Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 64 and 127 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 9 }

        tokenRingPStatsDataPkts128to255Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 128 and 255 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 10 }

        tokenRingPStatsDataPkts256to511Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 256 and 511 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 11 }

        tokenRingPStatsDataPkts512to1023Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 512 and 1023 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
```

```
            ::= { tokenRingPStatsEntry 12 }

        tokenRingPStatsDataPkts1024to2047Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 1024 and 2047 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 13 }

        tokenRingPStatsDataPkts2048to4095Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 2048 and 4095 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 14 }

        tokenRingPStatsDataPkts4096to8191Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 4096 and 8191 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 15 }

        tokenRingPStatsDataPkts8192to18000Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were between 8192 and 18000 octets in length
                    inclusive, excluding framing bits but including
                    FCS octets."
            ::= { tokenRingPStatsEntry 16 }

        tokenRingPStatsDataPktsGreaterThan18000Octets OBJECT-TYPE
            SYNTAX Counter
```

```
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    that were greater than 18000 octets in length,
                    excluding framing bits but including FCS octets."
            ::= { tokenRingPStatsEntry 17 }

        tokenRingPStatsOwner OBJECT-TYPE
            SYNTAX OwnerString
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The entity that configured this entry and is
                    therefore using the resources assigned to it."
            ::= { tokenRingPStatsEntry 18 }

        tokenRingPStatsStatus OBJECT-TYPE
            SYNTAX EntryStatus
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The status of this tokenRingPStats entry."
            ::= { tokenRingPStatsEntry 19 }


        -- The Token Ring History Groups

        -- When an entry in the historyControlTable is created that
        -- identifies a token ring interface as its
        -- historyControlDataSource, the probe shall create
        -- corresponding entries in the tokenRingMLHistoryTable
        -- and/or the tokenRingPHistoryTable, depending on which
        -- groups it supports.


        -- The Token Ring Mac-Layer History Group
        --
        -- Implementation of this group is optional.
        -- Implementation of this group requires implementation of
        -- the historyControl group from RFC1271.

        tokenRingMLHistoryTable OBJECT-TYPE
            SYNTAX SEQUENCE OF TokenRingMLHistoryEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A list of Mac-Layer Token Ring statistics
```

```
                entries."
        ::= { history 3 }

    tokenRingMLHistoryEntry OBJECT-TYPE
        SYNTAX TokenRingMLHistoryEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A collection of Mac-Layer statistics kept for a
                particular Token Ring interface."
        INDEX { tokenRingMLHistoryIndex,
                tokenRingMLHistorySampleIndex }
        ::= { tokenRingMLHistoryTable 1 }

    -- As an example, an instance of the
    -- tokenRingMLHistoryMacOctets
    -- object might be named tokenRingMLHistoryMacOctets.1.27

    TokenRingMLHistoryEntry ::= SEQUENCE {
        tokenRingMLHistoryIndex                     INTEGER,
        tokenRingMLHistorySampleIndex               INTEGER,
        tokenRingMLHistoryIntervalStart             TimeTicks,
        tokenRingMLHistoryDropEvents                Counter,
        tokenRingMLHistoryMacOctets                 Counter,
        tokenRingMLHistoryMacPkts                   Counter,
        tokenRingMLHistoryRingPurgeEvents           Counter,
        tokenRingMLHistoryRingPurgePkts             Counter,
        tokenRingMLHistoryBeaconEvents              Counter,
        tokenRingMLHistoryBeaconTime                TimeInterval,
        tokenRingMLHistoryBeaconPkts                Counter,
        tokenRingMLHistoryClaimTokenEvents          Counter,
        tokenRingMLHistoryClaimTokenPkts            Counter,
        tokenRingMLHistoryNAUNChanges               Counter,
        tokenRingMLHistoryLineErrors                Counter,
        tokenRingMLHistoryInternalErrors            Counter,
        tokenRingMLHistoryBurstErrors               Counter,
        tokenRingMLHistoryACErrors                  Counter,
        tokenRingMLHistoryAbortErrors               Counter,
        tokenRingMLHistoryLostFrameErrors           Counter,
        tokenRingMLHistoryCongestionErrors          Counter,
        tokenRingMLHistoryFrameCopiedErrors         Counter,
        tokenRingMLHistoryFrequencyErrors           Counter,
        tokenRingMLHistoryTokenErrors               Counter,
        tokenRingMLHistorySoftErrorReports          Counter,
        tokenRingMLHistoryRingPollEvents            Counter,
        tokenRingMLHistoryActiveStations            INTEGER
    }
```

```
        tokenRingMLHistoryIndex OBJECT-TYPE
            SYNTAX INTEGER (1..65535)
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The history of which this entry is a part.  The
                    history identified by a particular value of this
                    index is the same history as identified by the
                    same value of historyControlIndex."
            ::= { tokenRingMLHistoryEntry 1 }

        tokenRingMLHistorySampleIndex OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "An index that uniquely identifies the particular
                    Mac-Layer sample this entry represents among all
                    Mac-Layer samples associated with the same
                    historyControlEntry.  This index starts at 1 and
                    increases by one as each new sample is taken."
            ::= { tokenRingMLHistoryEntry 2 }

        tokenRingMLHistoryIntervalStart OBJECT-TYPE
            SYNTAX TimeTicks
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of sysUpTime at the start of the
                    interval over which this sample was measured.  If
                    the probe keeps track of the time of day, it
                    should start the first sample of the history at a
                    time such that when the next hour of the day
                    begins, a sample is started at that instant.  Note
                    that following this rule may require the probe to
                    delay collecting the first sample of the history,
                    as each sample must be of the same interval.  Also
                    note that the sample which is currently being
                    collected is not accessible in this table until
                    the end of its interval."
            ::= { tokenRingMLHistoryEntry 3 }

        tokenRingMLHistoryDropEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of events in which packets were
```

```
                    dropped by the probe due to lack of resources
                    during this sampling interval.  Note that this
                    number is not necessarily the number of packets
                    dropped, it is just the number of times this
                    condition has been detected."
            ::= { tokenRingMLHistoryEntry 4 }

        tokenRingMLHistoryMacOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of octets of data in MAC packets
                    (excluding those that were not good frames)
                    received on the network during this sampling
                    interval (excluding framing bits but including FCS
                    octets)."
            ::= { tokenRingMLHistoryEntry 5 }

        tokenRingMLHistoryMacPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of MAC packets (excluding those
                    that were not good frames) received during this
                    sampling interval."
            ::= { tokenRingMLHistoryEntry 6 }

        tokenRingMLHistoryRingPurgeEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of times that the ring entered
                    the ring purge state from normal ring state during
                    this sampling interval.  The ring purge state that
                    comes from the claim token or beacon state is not
                    counted."
            ::= { tokenRingMLHistoryEntry 7 }

        tokenRingMLHistoryRingPurgePkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of Ring Purge MAC packets
                    detected by the probe during this sampling
```

```
                interval."
        ::= { tokenRingMLHistoryEntry 8 }

    tokenRingMLHistoryBeaconEvents OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of times that the ring enters a
                beaconing state (beaconFrameStreamingState,
                beaconBitStreamingState,
                beaconSetRecoveryModeState, or
                beaconRingSignalLossState) during this sampling
                interval.  Note that a change of the source
                address of the beacon packet does not constitute a
                new beacon event."
        ::= { tokenRingMLHistoryEntry 9 }

    tokenRingMLHistoryBeaconTime OBJECT-TYPE
        SYNTAX TimeInterval
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The amount of time that the ring has been in the
                beaconing state during this sampling interval."
        ::= { tokenRingMLHistoryEntry 10 }

    tokenRingMLHistoryBeaconPkts OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of beacon MAC packets detected
                by the probe during this sampling interval."
        ::= { tokenRingMLHistoryEntry 11 }

    tokenRingMLHistoryClaimTokenEvents OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of times that the ring enters
                the claim token state from normal ring state or
                ring purge state during this sampling interval.
                The claim token state that comes from the beacon
                state is not counted."
        ::= { tokenRingMLHistoryEntry 12 }
```

```
        tokenRingMLHistoryClaimTokenPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of claim token MAC packets
                    detected by the probe during this sampling
                    interval."
            ::= { tokenRingMLHistoryEntry 13 }

        tokenRingMLHistoryNAUNChanges OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of NAUN changes detected by the
                    probe during this sampling interval."
            ::= { tokenRingMLHistoryEntry 14 }

        tokenRingMLHistoryLineErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of line errors reported in error
                    reporting packets detected by the probe during
                    this sampling interval."
            ::= { tokenRingMLHistoryEntry 15 }

        tokenRingMLHistoryInternalErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of adapter internal errors
                    reported in error reporting packets detected by
                    the probe during this sampling interval."
            ::= { tokenRingMLHistoryEntry 16 }

        tokenRingMLHistoryBurstErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of burst errors reported in
                    error reporting packets detected by the probe
                    during this sampling interval."
            ::= { tokenRingMLHistoryEntry 17 }
```

```
        tokenRingMLHistoryACErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of AC (Address Copied) errors
                    reported in error reporting packets detected by
                    the probe during this sampling interval."
            ::= { tokenRingMLHistoryEntry 18 }

        tokenRingMLHistoryAbortErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of abort delimiters reported in
                    error reporting packets detected by the probe
                    during this sampling interval."
            ::= { tokenRingMLHistoryEntry 19 }

        tokenRingMLHistoryLostFrameErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of lost frame errors reported in
                    error reporting packets detected by the probe
                    during this sampling interval."
            ::= { tokenRingMLHistoryEntry 20 }

        tokenRingMLHistoryCongestionErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of receive congestion errors
                    reported in error reporting packets detected by
                    the probe during this sampling interval."
            ::= { tokenRingMLHistoryEntry 21 }

        tokenRingMLHistoryFrameCopiedErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frame copied errors reported
                    in error reporting packets detected by the probe
                    during this sampling interval."
```

```
            ::= { tokenRingMLHistoryEntry 22 }

        tokenRingMLHistoryFrequencyErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frequency errors reported in
                    error reporting packets detected by the probe
                    during this sampling interval."
            ::= { tokenRingMLHistoryEntry 23 }

        tokenRingMLHistoryTokenErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of token errors reported in
                    error reporting packets detected by the probe
                    during this sampling interval."
            ::= { tokenRingMLHistoryEntry 24 }

        tokenRingMLHistorySoftErrorReports OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of soft error report frames
                    detected by the probe during this sampling
                    interval."
            ::= { tokenRingMLHistoryEntry 25 }

        tokenRingMLHistoryRingPollEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of ring poll events detected by
                    the probe during this sampling interval."
            ::= { tokenRingMLHistoryEntry 26 }

        tokenRingMLHistoryActiveStations OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The maximum number of active stations on the ring
                    detected by the probe during this sampling
```

```
                interval."
        ::= { tokenRingMLHistoryEntry 27}


    -- The Token Ring Promiscuous History Group
    --
    -- Implementation of this group is optional.
    -- Implementation of this group requires the implementation
    -- of the historyControl group from RFC1271.

    tokenRingPHistoryTable OBJECT-TYPE
        SYNTAX SEQUENCE OF TokenRingPHistoryEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A list of promiscuous Token Ring statistics
                entries."
        ::= { history 4 }

    tokenRingPHistoryEntry OBJECT-TYPE
        SYNTAX TokenRingPHistoryEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A collection of promiscuous statistics kept for a
                particular Token Ring interface."
        INDEX { tokenRingPHistoryIndex,
                tokenRingPHistorySampleIndex }
        ::= { tokenRingPHistoryTable 1 }

    -- As an example, an instance of the
    -- tokenRingPHistoryDataPkts object
    -- might be named tokenRingPHistoryDataPkts.1.27

    TokenRingPHistoryEntry ::= SEQUENCE {
        tokenRingPHistoryIndex                          INTEGER,
        tokenRingPHistorySampleIndex                    INTEGER,
        tokenRingPHistoryIntervalStart                  TimeTicks,
        tokenRingPHistoryDropEvents                     Counter,
        tokenRingPHistoryDataOctets                     Counter,
        tokenRingPHistoryDataPkts                       Counter,
        tokenRingPHistoryDataBroadcastPkts              Counter,
        tokenRingPHistoryDataMulticastPkts              Counter,
        tokenRingPHistoryDataPkts18to63Octets           Counter,
        tokenRingPHistoryDataPkts64to127Octets          Counter,
        tokenRingPHistoryDataPkts128to255Octets         Counter,
        tokenRingPHistoryDataPkts256to511Octets         Counter,
        tokenRingPHistoryDataPkts512to1023Octets        Counter,
```

```
        tokenRingPHistoryDataPkts1024to2047Octets       Counter,
        tokenRingPHistoryDataPkts2048to4095Octets       Counter,
        tokenRingPHistoryDataPkts4096to8191Octets       Counter,
        tokenRingPHistoryDataPkts8192to18000Octets      Counter,
        tokenRingPHistoryDataPktsGreaterThan18000Octets Counter
    }

    tokenRingPHistoryIndex OBJECT-TYPE
        SYNTAX INTEGER (1..65535)
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The history of which this entry is a part.  The
                history identified by a particular value of this
                index is the same history as identified by the
                same value of historyControlIndex."
        ::= { tokenRingPHistoryEntry 1 }

    tokenRingPHistorySampleIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "An index that uniquely identifies the particular
                sample this entry represents among all samples
                associated with the same historyControlEntry.
                This index starts at 1 and increases by one as
                each new sample is taken."
        ::= { tokenRingPHistoryEntry 2 }

    tokenRingPHistoryIntervalStart OBJECT-TYPE
        SYNTAX TimeTicks
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The value of sysUpTime at the start of the
                interval over which this sample was measured.  If
                the probe keeps track of the time of day, it
                should start the first sample of the history at a
                time such that when the next hour of the day
                begins, a sample is started at that instant.  Note
                that following this rule may require the probe to
                delay collecting the first sample of the history,
                as each sample must be of the same interval.  Also
                note that the sample which is currently being
                collected is not accessible in this table until
                the end of its interval."
        ::= { tokenRingPHistoryEntry 3 }
```

```
        tokenRingPHistoryDropEvents OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of events in which packets were
                    dropped by the probe due to lack of resources
                    during this sampling interval.  Note that this
                    number is not necessarily the number of packets
                    dropped, it is just the number of times this
                    condition has been detected."
            ::= { tokenRingPHistoryEntry 4 }

        tokenRingPHistoryDataOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of octets of data in good frames
                    received on the network (excluding framing bits
                    but including FCS octets) in non-MAC packets
                    during this sampling interval."
            ::= { tokenRingPHistoryEntry 5 }

        tokenRingPHistoryDataPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval."
            ::= { tokenRingPHistoryEntry 6 }

        tokenRingPHistoryDataBroadcastPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were directed
                    to an LLC broadcast address (0xFFFFFFFFFFFF or
                    0xC000FFFFFFFF)."
            ::= { tokenRingPHistoryEntry 7 }

        tokenRingPHistoryDataMulticastPkts OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
```

```
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were directed
                    to a local or global multicast or functional
                    address.  Note that this number does not include
                    packets directed to the broadcast address."
            ::= { tokenRingPHistoryEntry 8 }

        tokenRingPHistoryDataPkts18to63Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were between 18
                    and 63 octets in length inclusive, excluding
                    framing bits but including FCS octets."
            ::= { tokenRingPHistoryEntry 9 }

        tokenRingPHistoryDataPkts64to127Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were between 64
                    and 127 octets in length inclusive, excluding
                    framing bits but including FCS octets."
            ::= { tokenRingPHistoryEntry 10 }

        tokenRingPHistoryDataPkts128to255Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were between
                    128 and 255 octets in length inclusive, excluding
                    framing bits but including FCS octets."
            ::= { tokenRingPHistoryEntry 11 }

        tokenRingPHistoryDataPkts256to511Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were between
```

```
                256 and 511 octets in length inclusive, excluding
                framing bits but including FCS octets."
        ::= { tokenRingPHistoryEntry 12 }

    tokenRingPHistoryDataPkts512to1023Octets OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of good non-MAC frames received
                during this sampling interval that were between
                512 and 1023 octets in length inclusive, excluding
                framing bits but including FCS octets."
        ::= { tokenRingPHistoryEntry 13 }

    tokenRingPHistoryDataPkts1024to2047Octets OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of good non-MAC frames received
                during this sampling interval that were between
                1024 and 2047 octets in length inclusive,
                excluding framing bits but including FCS octets."
        ::= { tokenRingPHistoryEntry 14 }

    tokenRingPHistoryDataPkts2048to4095Octets OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of good non-MAC frames received
                during this sampling interval that were between
                2048 and 4095 octets in length inclusive,
                excluding framing bits but including FCS octets."
        ::= { tokenRingPHistoryEntry 15 }

    tokenRingPHistoryDataPkts4096to8191Octets OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The total number of good non-MAC frames received
                during this sampling interval that were between
                4096 and 8191 octets in length inclusive,
                excluding framing bits but including FCS octets."
        ::= { tokenRingPHistoryEntry 16 }
```

```
        tokenRingPHistoryDataPkts8192to18000Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were between
                    8192 and 18000 octets in length inclusive,
                    excluding framing bits but including FCS octets."
            ::= { tokenRingPHistoryEntry 17 }

        tokenRingPHistoryDataPktsGreaterThan18000Octets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good non-MAC frames received
                    during this sampling interval that were greater
                    than 18000 octets in length, excluding framing
                    bits but including FCS octets."
            ::= { tokenRingPHistoryEntry 18 }


        -- The Token Ring Ring Station Group
        --
        -- Implementation of this group is optional
        --
        -- Although the ringStationTable stores entries only for
        -- those stations physically attached to the local ring and
        -- the number of stations attached to a ring is limited, a
        -- probe may still need to free resources when resources
        -- grow tight.  In such a situation, it is suggested that
        -- the probe free only inactive stations, and to
        -- first free the stations that have been inactive for the
        -- longest time.

        ringStationControlTable OBJECT-TYPE
            SYNTAX SEQUENCE OF RingStationControlEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A list of ringStation table control entries."
            ::= { tokenRing 1 }

        ringStationControlEntry OBJECT-TYPE
            SYNTAX RingStationControlEntry
            ACCESS not-accessible
            STATUS mandatory
```

```
        DESCRIPTION
                "A list of parameters that set up the discovery of
                stations on a particular interface and the
                collection of statistics about these stations."
        INDEX { ringStationControlIfIndex }
        ::= { ringStationControlTable 1 }

    -- As an example, an instance of the
    -- ringStationControlIfIndex object
    -- might be named ringStationControlIfIndex.1

    RingStationControlEntry ::= SEQUENCE {
        ringStationControlIfIndex          INTEGER,
        ringStationControlTableSize        INTEGER,
        ringStationControlActiveStations   INTEGER,
        ringStationControlRingState        INTEGER,
        ringStationControlBeaconSender     MacAddress,
        ringStationControlBeaconNAUN       MacAddress,
        ringStationControlActiveMonitor    MacAddress,
        ringStationControlOrderChanges     Counter,
        ringStationControlOwner            OwnerString,
        ringStationControlStatus           EntryStatus
    }

    ringStationControlIfIndex OBJECT-TYPE
        SYNTAX INTEGER (1..65535)
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The value of this object uniquely identifies the
                interface on this remote network monitoring device
                from which ringStation data is collected.  The
                interface identified by a particular value of this
                object is the same interface as identified by the
                same value of the ifIndex object, defined in MIB-
                II [3]."
        ::= { ringStationControlEntry 1 }

    ringStationControlTableSize OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The number of ringStationEntries in the
                ringStationTable associated with this
                ringStationControlEntry."
        ::= { ringStationControlEntry 2 }
```

```
        ringStationControlActiveStations OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The number of active ringStationEntries in the
                    ringStationTable associated with this
                    ringStationControlEntry."
            ::= { ringStationControlEntry 3 }

        ringStationControlRingState OBJECT-TYPE
            SYNTAX INTEGER {
                normalOperation(1),
                ringPurgeState(2),
                claimTokenState(3),
                beaconFrameStreamingState(4),
                beaconBitStreamingState(5),
                beaconRingSignalLossState(6),
                beaconSetRecoveryModeState(7)
            }
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The current status of this ring."
            ::= { ringStationControlEntry 4 }

        ringStationControlBeaconSender OBJECT-TYPE
            SYNTAX MacAddress
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The address of the sender of the last beacon
                    frame received by the probe on this ring.  If no
                    beacon frames have been received, this object
                    shall be equal to six octets of zero."
            ::= { ringStationControlEntry 5 }

        ringStationControlBeaconNAUN OBJECT-TYPE
            SYNTAX MacAddress
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The address of the NAUN in the last beacon frame
                    received by the probe on this ring.  If no beacon
                    frames have been received, this object shall be
                    equal to six octets of zero."
            ::= { ringStationControlEntry 6 }
```

```
        ringStationControlActiveMonitor OBJECT-TYPE
            SYNTAX MacAddress
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The address of the Active Monitor on this
                    segment.  If this address is unknown, this object
                    shall be equal to six octets of zero."
            ::= { ringStationControlEntry 7 }

        ringStationControlOrderChanges OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The number of add and delete events in the
                    ringStationOrderTable optionally associated with
                    this ringStationControlEntry."
            ::= { ringStationControlEntry 8 }

        ringStationControlOwner OBJECT-TYPE
            SYNTAX OwnerString
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The entity that configured this entry and is
                    therefore using the resources assigned to it."
            ::= { ringStationControlEntry 9 }

        ringStationControlStatus OBJECT-TYPE
            SYNTAX EntryStatus
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The status of this ringStationControl entry.

                    If this object is not equal to valid(1), all
                    associated entries in the ringStationTable shall
                    be deleted by the agent."
            ::= { ringStationControlEntry 10 }

        ringStationTable OBJECT-TYPE
            SYNTAX SEQUENCE OF RingStationEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A list of ring station entries.  An entry will
                    exist for each station that is now or has
```

```
                previously been detected as physically present on
                this ring."
        ::= { tokenRing 2 }

    ringStationEntry OBJECT-TYPE
        SYNTAX RingStationEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A collection of statistics for a particular
                station that has been discovered on a ring
                monitored by this device."
        INDEX { ringStationIfIndex, ringStationMacAddress }
        ::= { ringStationTable 1 }

    -- As an example, an instance of the
    -- ringStationStationStatus object might be named
    -- ringStationStationStatus.1.16.0.90.0.64.131

    RingStationEntry ::= SEQUENCE {
        ringStationIfIndex                INTEGER,
        ringStationMacAddress             MacAddress,
        ringStationLastNAUN               MacAddress,
        ringStationStationStatus          INTEGER,
        ringStationLastEnterTime          TimeTicks,
        ringStationLastExitTime           TimeTicks,
        ringStationDuplicateAddresses     Counter,
        ringStationInLineErrors           Counter,
        ringStationOutLineErrors          Counter,
        ringStationInternalErrors         Counter,
        ringStationInBurstErrors          Counter,
        ringStationOutBurstErrors         Counter,
        ringStationACErrors               Counter,
        ringStationAbortErrors            Counter,
        ringStationLostFrameErrors        Counter,
        ringStationCongestionErrors       Counter,
        ringStationFrameCopiedErrors      Counter,
        ringStationFrequencyErrors        Counter,
        ringStationTokenErrors            Counter,
        ringStationInBeaconErrors         Counter,
        ringStationOutBeaconErrors        Counter,
        ringStationInsertions             Counter
    }

    ringStationIfIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
```

```
            DESCRIPTION
                    "The value of this object uniquely identifies the
                    interface on this remote network monitoring device
                    on which this station was detected.  The interface
                    identified by a particular value of this object is
                    the same interface as identified by the same value
                    of the ifIndex object, defined in MIB-II [3]."
            ::= { ringStationEntry 1 }

        ringStationMacAddress OBJECT-TYPE
            SYNTAX MacAddress
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The physical address of this station."
            ::= { ringStationEntry 2 }

        ringStationLastNAUN OBJECT-TYPE
            SYNTAX MacAddress
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The physical address of last known NAUN of this
                    station."
            ::= { ringStationEntry 3 }

        ringStationStationStatus OBJECT-TYPE
            SYNTAX INTEGER {
                active(1),    -- actively participating in ring poll.
                inactive(2),  -- Not participating in ring poll
                forcedRemoval(3) -- Forced off ring by network
                                 -- management.
            }
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The status of this station on the ring."
            ::= { ringStationEntry 4 }

        ringStationLastEnterTime OBJECT-TYPE
            SYNTAX TimeTicks
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of sysUpTime at the time this station
                    last entered the ring.  If the time is unknown,
                    this value shall be zero."
            ::= { ringStationEntry 5 }
```

```
        ringStationLastExitTime OBJECT-TYPE
            SYNTAX TimeTicks
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of sysUpTime at the time the probe
                    detected that this station last exited the ring.
                    If the time is unknown, this value shall be zero."
            ::= { ringStationEntry 6 }

        ringStationDuplicateAddresses OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The number of times this station experienced a
                    duplicate address error."
            ::= { ringStationEntry 7 }

        ringStationInLineErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of line errors reported by this
                    station in error reporting packets detected by the
                    probe."
            ::= { ringStationEntry 8 }

        ringStationOutLineErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of line errors reported in error
                    reporting packets sent by the nearest active
                    downstream neighbor of this station and detected
                    by the probe."
            ::= { ringStationEntry 9 }

        ringStationInternalErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of adapter internal errors
                    reported by this station in error reporting
                    packets detected by the probe."
```

```
            ::= { ringStationEntry 10 }

        ringStationInBurstErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of burst errors reported by this
                    station in error reporting packets detected by the
                    probe."
            ::= { ringStationEntry 11 }

        ringStationOutBurstErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of burst errors reported in
                    error reporting packets sent by the nearest active
                    downstream neighbor of this station and detected
                    by the probe."
            ::= { ringStationEntry 12 }

        ringStationACErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of AC (Address Copied) errors
                    reported in error reporting packets sent by the
                    nearest active downstream neighbor of this station
                    and detected by the probe."
            ::= { ringStationEntry 13 }

        ringStationAbortErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of abort delimiters reported by
                    this station in error reporting packets detected
                    by the probe."
            ::= { ringStationEntry 14 }

        ringStationLostFrameErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
```

```
            DESCRIPTION
                    "The total number of lost frame errors reported by
                    this station in error reporting packets detected
                    by the probe."
            ::= { ringStationEntry 15 }

        ringStationCongestionErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of receive congestion errors
                    reported by this station in error reporting
                    packets detected by the probe."
            ::= { ringStationEntry 16 }

        ringStationFrameCopiedErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frame copied errors reported
                    by this station in error reporting packets
                    detected by the probe."
            ::= { ringStationEntry 17 }

        ringStationFrequencyErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frequency errors reported by
                    this station in error reporting packets detected
                    by the probe."
            ::= { ringStationEntry 18 }

        ringStationTokenErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of token errors reported by this
                    station in error reporting frames detected by the
                    probe."
            ::= { ringStationEntry 19 }

        ringStationInBeaconErrors OBJECT-TYPE
            SYNTAX Counter
```

```
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of beacon frames sent by this
                    station and detected by the probe."
            ::= { ringStationEntry 20 }

        ringStationOutBeaconErrors OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of beacon frames detected by the
                    probe that name this station as the NAUN."
            ::= { ringStationEntry 21 }

        ringStationInsertions OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The number of times the probe detected this
                    station inserting onto the ring."
            ::= { ringStationEntry 22 }


        -- The Token Ring Ring Station Order Group
        --
        -- Implementation of this group is optional
        --

        -- The ringStationOrderTable

        ringStationOrderTable OBJECT-TYPE
            SYNTAX SEQUENCE OF RingStationOrderEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A list of ring station entries for stations in
                    the ring poll, ordered by their ring-order."
            ::= { tokenRing 3 }

        ringStationOrderEntry OBJECT-TYPE
            SYNTAX RingStationOrderEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A collection of statistics for a particular
```

```
                station that is active on a ring monitored by this
                device.  This table will contain information for
                every interface that has a
                ringStationControlStatus equal to valid."
        INDEX { ringStationOrderIfIndex,
                ringStationOrderOrderIndex }
        ::= { ringStationOrderTable 1 }

    -- As an example, an instance of the
    -- ringStationOrderMacAddress object might be named
    -- ringStationOrderMacAddress.1.14

    RingStationOrderEntry ::= SEQUENCE {
        ringStationOrderIfIndex             INTEGER,
        ringStationOrderOrderIndex          INTEGER,
        ringStationOrderMacAddress          MacAddress
    }

    ringStationOrderIfIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The value of this object uniquely identifies the
                interface on this remote network monitoring device
                on which this station was detected.  The interface
                identified by a particular value of this object is
                the same interface as identified by the same value
                of the ifIndex object, defined in MIB-II [3]."
        ::= { ringStationOrderEntry 1 }

    ringStationOrderOrderIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "This index denotes the location of this station
                with respect to other stations on the ring.  This
                index is one more than the number of hops
                downstream that this station is from the rmon
                probe.  The rmon probe itself gets the value one."
        ::= { ringStationOrderEntry 2 }

    ringStationOrderMacAddress OBJECT-TYPE
        SYNTAX MacAddress
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
```

```
                "The physical address of this station."
        ::= { ringStationOrderEntry 3 }


    -- The Token Ring Ring Station Config Group
    --
    -- Implementation of this group is optional.
    -- The ring station config group manages token ring nodes
    -- through active means.

    ringStationConfigControlTable OBJECT-TYPE
        SYNTAX SEQUENCE OF RingStationConfigControlEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A list of ring station configuration control
                entries."
        ::= { tokenRing 4 }

    ringStationConfigControlEntry OBJECT-TYPE
        SYNTAX RingStationConfigControlEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "This entry controls active management of stations
                by the probe.  One entry exists in this table for
                each active station in the ringStationTable."
        INDEX { ringStationConfigControlIfIndex,
                ringStationConfigControlMacAddress }
        ::= { ringStationConfigControlTable 1 }

    -- As an example, an instance of the
    -- ringStationConfigControlRemove object might be named
    -- ringStationConfigControlRemove.1.16.0.90.0.64.131

    RingStationConfigControlEntry ::= SEQUENCE {
        ringStationConfigControlIfIndex         INTEGER,
        ringStationConfigControlMacAddress      MacAddress,
        ringStationConfigControlRemove          INTEGER,
        ringStationConfigControlUpdateStats     INTEGER
    }

    ringStationConfigControlIfIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The value of this object uniquely identifies the
```

```
                    interface on this remote network monitoring device
                    on which this station was detected.  The interface
                    identified by a particular value of this object is
                    the same interface as identified by the same value
                    of the ifIndex object, defined in MIB-II [3]."
            ::= { ringStationConfigControlEntry 1 }

        ringStationConfigControlMacAddress OBJECT-TYPE
            SYNTAX MacAddress
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The physical address of this station."
            ::= { ringStationConfigControlEntry 2 }

        ringStationConfigControlRemove OBJECT-TYPE
            SYNTAX INTEGER {
                stable(1),
                removing(2)
            }
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "Setting this object to `removing(2)' causes a
                    Remove Station MAC frame to be sent.  The agent
                    will set this object to `stable(1)' after
                    processing the request."
            ::= { ringStationConfigControlEntry 3 }

        ringStationConfigControlUpdateStats OBJECT-TYPE
            SYNTAX INTEGER {
                stable(1),
                updating(2)
            }
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "Setting this object to `updating(2)' causes the
                    configuration information associate with this
                    entry to be updated.  The agent will set this
                    object to `stable(1)' after processing the
                    request."
            ::= { ringStationConfigControlEntry 4 }
```

```
        --  The ringStationConfig Table
        --
        --  Entries exist in this table after an active
        --  configuration query has completed successfully for
        --  a station.  This query is initiated by the associated
        --  ringStationConfigControlUpdateStats variable.

        ringStationConfigTable OBJECT-TYPE
            SYNTAX SEQUENCE OF RingStationConfigEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A list of configuration entries for stations on a
                    ring monitored by this probe."
            ::= { tokenRing 5 }

        ringStationConfigEntry OBJECT-TYPE
            SYNTAX RingStationConfigEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                    "A collection of statistics for a particular
                    station that has been discovered on a ring
                    monitored by this probe."
            INDEX { ringStationConfigIfIndex,
                    ringStationConfigMacAddress }
            ::= { ringStationConfigTable 1 }

        -- As an example, an instance of the
        -- ringStationConfigLocation object might be named
        -- ringStationConfigLocation.1.16.0.90.0.64.131

        RingStationConfigEntry ::= SEQUENCE {
            ringStationConfigIfIndex            INTEGER,
            ringStationConfigMacAddress         MacAddress,
            ringStationConfigUpdateTime         TimeTicks,
            ringStationConfigLocation           OCTET STRING,
            ringStationConfigMicrocode          OCTET STRING,
            ringStationConfigGroupAddress       OCTET STRING,
            ringStationConfigFunctionalAddress  OCTET STRING
        }

        ringStationConfigIfIndex OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of this object uniquely identifies the
```

```
                    interface on this remote network monitoring device
                    on which this station was detected.  The interface
                    identified by a particular value of this object is
                    the same interface as identified by the same value
                    of the ifIndex object, defined in MIB-II [3]."
            ::= { ringStationConfigEntry 1 }

        ringStationConfigMacAddress OBJECT-TYPE
            SYNTAX MacAddress
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The physical address of this station."
            ::= { ringStationConfigEntry 2 }

        ringStationConfigUpdateTime OBJECT-TYPE
            SYNTAX TimeTicks
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of sysUpTime at the time this
                    configuration information was last updated
                    (completely)."
            ::= { ringStationConfigEntry 3 }

        ringStationConfigLocation OBJECT-TYPE
            SYNTAX OCTET STRING (SIZE(4))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The assigned physical location of this station."
            ::= { ringStationConfigEntry 4 }

        ringStationConfigMicrocode OBJECT-TYPE
            SYNTAX OCTET STRING (SIZE(10))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The microcode EC level of this station."
            ::= { ringStationConfigEntry 5 }

        ringStationConfigGroupAddress OBJECT-TYPE
            SYNTAX OCTET STRING (SIZE(4))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The low-order 4 octets of the group address
                    recognized by this station."
```

```
        ::= { ringStationConfigEntry 6 }

    ringStationConfigFunctionalAddress OBJECT-TYPE
        SYNTAX OCTET STRING (SIZE(4))
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "the functional addresses recognized by this
                station."
        ::= { ringStationConfigEntry 7 }


    -- The Token Ring Source Routing group
    --
    -- Implementation of this group is optional.
    -- The data in this group is collected from the source
    -- routing information potentially present in any token ring
    -- packet.  This information will be valid only in a pure
    -- source route bridging environment.  In a transparent
    -- bridging or a mixed bridging environment, this
    -- information may not be accurate.

    sourceRoutingStatsTable OBJECT-TYPE
        SYNTAX SEQUENCE OF SourceRoutingStatsEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A list of source routing statistics entries."
        ::= { tokenRing 6 }

    sourceRoutingStatsEntry OBJECT-TYPE
        SYNTAX SourceRoutingStatsEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A collection of source routing statistics kept
                for a particular Token Ring interface."
        INDEX { sourceRoutingStatsIfIndex }
        ::= { sourceRoutingStatsTable 1 }

    -- As an example, an instance of the
    -- sourceRoutingStatsInFrames object might be named
    -- sourceRoutingStatsInFrames.1

    SourceRoutingStatsEntry ::= SEQUENCE {
        sourceRoutingStatsIfIndex                   INTEGER,
        sourceRoutingStatsRingNumber                INTEGER,
        sourceRoutingStatsInFrames                  Counter,
```

```
                -- in to our net

            sourceRoutingStatsOutFrames                    Counter,
                -- out from our net

            sourceRoutingStatsThroughFrames                Counter,
                -- through our net

            sourceRoutingStatsAllRoutesBroadcastFrames     Counter,
            sourceRoutingStatsSingleRouteBroadcastFrames   Counter,
            sourceRoutingStatsInOctets                     Counter,
            sourceRoutingStatsOutOctets                    Counter,
            sourceRoutingStatsThroughOctets                Counter,
            sourceRoutingStatsAllRoutesBroadcastOctets     Counter,
            sourceRoutingStatsSingleRoutesBroadcastOctets Counter,
            sourceRoutingStatsLocalLLCFrames               Counter,
            sourceRoutingStats1HopFrames                   Counter,
            sourceRoutingStats2HopsFrames                  Counter,
            sourceRoutingStats3HopsFrames                  Counter,
            sourceRoutingStats4HopsFrames                  Counter,
            sourceRoutingStats5HopsFrames                  Counter,
            sourceRoutingStats6HopsFrames                  Counter,
            sourceRoutingStats7HopsFrames                  Counter,
            sourceRoutingStats8HopsFrames                  Counter,
            sourceRoutingStatsMoreThan8HopsFrames          Counter,
            sourceRoutingStatsOwner                        OwnerString,
            sourceRoutingStatsStatus                       EntryStatus
        }

        sourceRoutingStatsIfIndex OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The value of this object uniquely identifies the
                    interface on this remote network monitoring device
                    on which source routing statistics will be
                    detected.  The interface identified by a
                    particular value of this object is the same
                    interface as identified by the same value of the
                    ifIndex object, defined in MIB-II [3]."
            ::= { sourceRoutingStatsEntry 1 }

        sourceRoutingStatsRingNumber OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
```

```
                    "The ring number of the ring monitored by this
                    entry.  When any object in this entry is created,
                    the probe will attempt to discover the ring
                    number.  Only after the ring number is discovered
                    will this object be created.  After creating an
                    object in this entry, the management station
                    should poll this object to detect when it is
                    created.  Only after this object is created can
                    the management station set the
                    sourceRoutingStatsStatus entry to valid(1)."
            ::= { sourceRoutingStatsEntry 2 }

        sourceRoutingStatsInFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The count of frames sent into this ring from
                    another ring."
            ::= { sourceRoutingStatsEntry 3 }

        sourceRoutingStatsOutFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The count of frames sent from this ring to
                    another ring."
            ::= { sourceRoutingStatsEntry 4 }

        sourceRoutingStatsThroughFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The count of frames sent from another ring,
                    through this ring, to another ring."
            ::= { sourceRoutingStatsEntry 5 }

        sourceRoutingStatsAllRoutesBroadcastFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good frames received that
                    were All Routes Broadcast."
            ::= { sourceRoutingStatsEntry 6 }
```

```
        sourceRoutingStatsSingleRouteBroadcastFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of good frames received that
                    were Single Route Broadcast."
            ::= { sourceRoutingStatsEntry 7 }

        sourceRoutingStatsInOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The count of octets in good frames sent into this
                    ring from another ring."
            ::= { sourceRoutingStatsEntry 8 }

        sourceRoutingStatsOutOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The count of octets in good frames sent from this
                    ring to another ring."
            ::= { sourceRoutingStatsEntry 9 }

        sourceRoutingStatsThroughOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The count of octets in good frames sent another
                    ring, through this ring, to another ring."
            ::= { sourceRoutingStatsEntry 10 }

        sourceRoutingStatsAllRoutesBroadcastOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of octets in good frames
                    received that were All Routes Broadcast."
            ::= { sourceRoutingStatsEntry 11 }

        sourceRoutingStatsSingleRoutesBroadcastOctets OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
```

```
            STATUS mandatory
            DESCRIPTION
                    "The total number of octets in good frames
                    received that were Single Route Broadcast."
            ::= { sourceRoutingStatsEntry 12 }

        sourceRoutingStatsLocalLLCFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received who had no
                    RIF field (or had a RIF field that only included
                    the local ring's number) and were not All Route
                    Broadcast Frames."
            ::= { sourceRoutingStatsEntry 13 }

        sourceRoutingStats1HopFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had 1 hop, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 14 }

        sourceRoutingStats2HopsFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had 2 hops, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 15 }

        sourceRoutingStats3HopsFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
```

```
                    "The total number of frames received whose route
                    had 3 hops, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 16 }

        sourceRoutingStats4HopsFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had 4 hops, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 17 }

        sourceRoutingStats5HopsFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had 5 hops, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 18 }

        sourceRoutingStats6HopsFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had 6 hops, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 19 }

        sourceRoutingStats7HopsFrames OBJECT-TYPE
```

```
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had 7 hops, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 20 }

        sourceRoutingStats8HopsFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had 8 hops, were not All Route Broadcast Frames,
                    and whose source or destination were on this ring
                    (i.e. frames that had a RIF field and had this
                    ring number in the first or last entry of the RIF
                    field)."
            ::= { sourceRoutingStatsEntry 21 }

        sourceRoutingStatsMoreThan8HopsFrames OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                    "The total number of frames received whose route
                    had more than 8 hops, were not All Route Broadcast
                    Frames, and whose source or destination were on
                    this ring (i.e. frames that had a RIF field and
                    had this ring number in the first or last entry of
                    the RIF field)."
            ::= { sourceRoutingStatsEntry 22 }

        sourceRoutingStatsOwner OBJECT-TYPE
            SYNTAX OwnerString
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The entity that configured this entry and is
                    therefore using the resources assigned to it."
            ::= { sourceRoutingStatsEntry 23 }

        sourceRoutingStatsStatus OBJECT-TYPE
```

```
            SYNTAX EntryStatus
            ACCESS read-write
            STATUS mandatory
            DESCRIPTION
                    "The status of this sourceRoutingStats entry."
            ::= { sourceRoutingStatsEntry 24 }

          END
```

6. References

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8. Security Considerations

Security issues are not discussed in this memo.

9. Author's Address

Steven Waldbusser
Carnegie Mellon University
4910 Forbes Ave.
Pittsburgh, PA 15213

Phone: (412) 268-6628
EMail: waldbusser@cmu.edu