

CHAPTER 5 NETWORK PROTOCOLS

5.1 CABLE COMMUNICATION PACKET

Each cable communication packet to the internet is shown below.

(1) Query from a gateway of the ‘zone repeater station’ to the ‘management server’

- G/w will make a query to the ‘management server’, serving the callsign information from calling station as an index.

| MAC header | | | IP header | UDP header | Query ID | Flag | Reserved | Query callsign |
|------------|----|------|--------------|------------|----------|------|----------|----------------|
| SA | DA | Type | | | | | | |
| 6 | 6 | 2 | 20+ α | 8bytes | 2bytes | 2 | 4bytes | 8bytes |

a: Although the length of IP header for TCP/IP protocol is normally 20bytes, it will make a variable length when options are included, so it depends on the protocols and thus shown here with $+a$.

(2) Reply to the g/w from the ‘management server’

- Searching the management table and retrieving the data, it will make a reply to the g/w that made a query.

| MAC header | | | IP header | UDP header | Query ID | Flag | Reserve | Query callsign | Zone repeater callsign | Area repeater callsign | GW IP address |
|------------|-----|------|--------------|------------|----------|------|---------|----------------|------------------------|------------------------|---------------|
| S A | D A | Type | | | | | | | | | |
| 6 | 6 | 2 | 20+ α | 8bytes | 2bytes | 2 | 4bytes | 8bytes | 8 | 8 | 4 |

(3) Request for table update from GW to the ‘management server’

| MAC header | | | IP header | UDP header | Update ID | Flag | Reserved | Mobile terminal callsign | Zone repeater callsign | Area repeater callsign |
|------------|----|------|--------------|------------|-----------|------|----------|--------------------------|------------------------|------------------------|
| SA | DA | Type | | | | | | | | |
| 6 | 6 | 2 | 20+ α | 8bytes | 2bytes | 2 | 4bytes | 8bytes | 8 | 8 |

(4) Reply indicating the completion of the update from the ‘management server’ to GW

| | | | | | | | | | |
|------------|----|-----|-------|-----|---------|--------|------|------|-------|
| MAC header | IP | UDP | Updat | Fla | Reserve | Mobile | Zone | Area | GW IP |
|------------|----|-----|-------|-----|---------|--------|------|------|-------|

| | | | | | | | | | | | |
|--------|--------|----------|--------------|------------|--------|---|--------|--------------------------|--------------------------|--------------------------|-------------|
| S A | D A | Typ e | heade r | heade r | e ID | g | d | termina l callsign | repeate r callsign | repeate r callsign | addres s |
| 6 | 6 | 2 | 20+ α | 8bytes | 2bytes | 2 | 4bytes | 8bytes | 8 | 8 | 4 |

(5) Communication between the GW for the zone repeater station of the calling station and the GW for the zone repeater station of the called station

- Data

| MAC header | | | IP head er | TCP head er | DST | Pack et lengt h | Main strea m head er | Wirele ss | Data | | | | FC S | |
|------------|--------|----------|------------------|-------------------|--------|--------------------------|----------------------------------|---|------------|-----------|------------|--------|----------|---------------------|
| S A | D A | Typ e | | | | | | | Heade r | E_L en | MAC header | | | Data segme nt |
| 6 | 6 | 2 | 20+ α | 20+ α | 4bytes | 2 | 7bytes | Data stream without bit and frame synchronization signals | | | S A | D A | Typ e | CR C |

This signal can be iterated up to the maximum of 1500 bytes, and, if exceeded, should make a next new packet.

- Voice Header

| MAC header | | | IP header | UDP header | DSTR | Flag | Reserved | Main stream header | Wireless Header | |
|------------|----|------|--------------|---------------|--------|--------|----------|--------------------------|--------------------|--|
| SA | DA | Type | | | | | | | 7bytes | |
| 6 | 6 | 2 | 20+a | 8bytes | 4bytes | 2bytes | 2bytes | 7bytes | | |

Wireless portion header without bit and frame synchronization signals

- Voice Data

| MAC header | | | IP header | UDP header | DSTR | Flag | Reserved | Main stream header | Data | |
|------------|----|------|--------------|---------------|--------|--------|----------|--------------------------|------------------|-----------------|
| SA | DA | Type | | | | | | | Voice segment | Data segment |
| 6 | 6 | 2 | 20+ α | 8bytes | 4bytes | 2bytes | 2bytes | 7bytes | | |

(6) An access to the internet through the GW of a zone repeater from terminal station

| MAC header | | | IP header | Data | | | | | | |
|------------|----|------|--------------|------|--|--|--|--|--|--|
| SA | DA | Type | | | | | | | | |
| 6 | 6 | 2 | | | | | | | | |

6 6 2

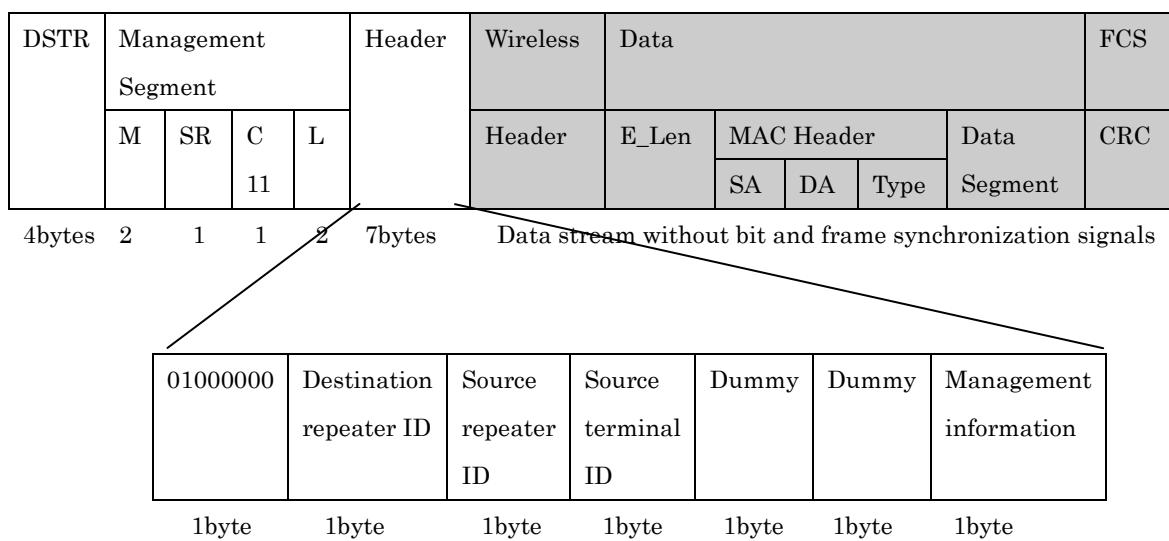
(7) An access to a terminal station through its GW from a station on the internet

| | | | | |
|------------|----|------|-----------|---|
| MAC header | | | IP header | Currently undefined other than the frame construction |
| SA | DA | Type | | |
| 6 | 6 | 2 | | |

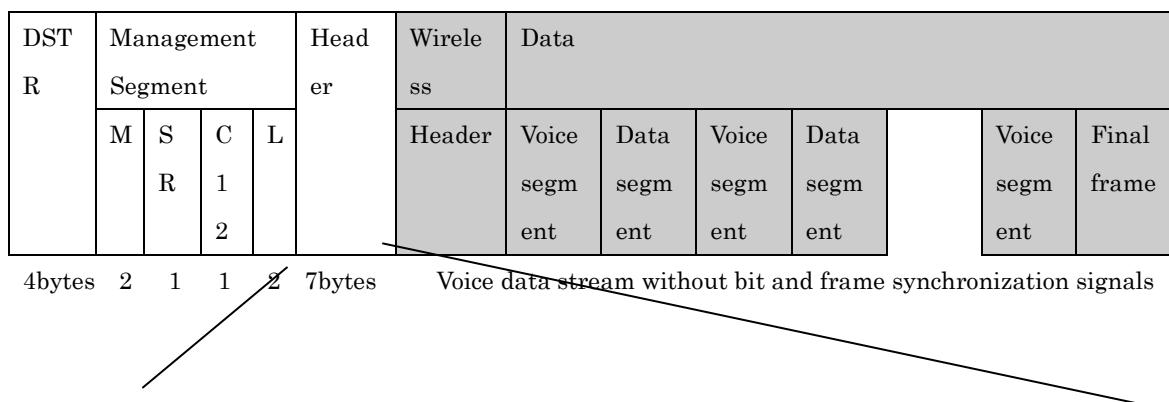
(8) Communication Between Zone Repeaters and Gateway

- A packet for the communication between z/r and g/w will be constructed as follows. A management segment for a packet contains following data.
 - M = the number of sequence (2 bytes)
 - ✧ This is a packet identification number assigned to the packet for communication between z/r and g/w. Normally it will be incremented by one.
 - S R = S, when sent from g/w; R, when received by g/w (1 byte)
 - C = a command which represent packet (1 byte)
 - L = length of the data following this segment (2 bytes)

- a. Data



- b. Voice data



| | | | | | | |
|---------------|-----------------------------|------------------------|--------------------------|-------------------------|-------------------------|------------------------|
| 00100000 0 | Destination ID repeaters | Source ID repeaters | Source ID terminators | Conversation ID (upper) | Conversation ID (lower) | Management information |
| 1byte | 1byte | 1byte | 1byte | 1byte | 1byte | 1byte |

● c. Error data

| DSTR | Management segment | | | | Error data |
|--------|--------------------|----|---------|---|------------|
| | M | SR | C 01 | L | |
| 4bytes | 2 | 1 | 1 | 2 | |

- d. Terminal location information data

| DSTR | Management segment | | | | Terminal Callsign | Area repeater callsign |
|--------|--------------------|----|----|---|-------------------|------------------------|
| | M | SR | C | L | | |
| 4bytes | 2 | 1 | 1 | 2 | 8bytes | 8bytes |
| | | | 21 | | | |

(9) Transmission of log data from g/w to a ‘management server’

| Reco rd | Recor d | Source termin | Dest termin | Sourc e IP | Dest IP | Source zone | Dest zone | Source area | Dest area |
|---------------|---------------------|------------------|----------------|---------------|---------------|----------------|--------------|----------------|--------------|
| time (sec) | time (micro sec) | al callsig | al callsig | address ss | address ss | repeat er | repeat er | repeat er | repeat er |
| | | n | n | | | callsig | callsig | callsig | callsig |
| | | | | | | n | n | n | n |

4bytes 4bytes 8bytes 8 4 4 8 8 8 8