are described above. If ALOHA transmissions are not allowed, retransmission must be delayed until retransmission becomes allowed again.

4.4.4 Failed ALOHA Transmissions

When an ALOHA transmission fails, the subscriber unit goes to the 'Out' state (see Section 7.1.7.8 on page 185). In the 'Out' state, the subscriber unit halts all inbound transmissions both scheduled and ALOHA, performs channel scanning, and initiates a Zone registration request when an appropriate channel is found. A failed inbound command may be retained and marked as pending or aborted by the subscriber unit.

When registration is granted in a zone, the unit must reset the retry_count for all pending inbound commands as described in rule 35 in Section 7.1.7.7 on page 184. It must use the ALOHA parameters decoded in that zone.

Note that when ALOHA commands are re-transmitted, it may be necessary to insert the most recent information (for example: see Section 4.8.1.2 on page 125 and Section 4.8.1.14 on page 132).

4.5 Timing Structure

All reverse channel transmission control and timing information is delivered on the forward control channel(s) in the BIWs. The scheduled/ALOHA boundaries can vary from frame to frame as traffic patterns demand. A subscriber unit transmission will be enabled only if the subscriber unit has decoded the required transmission command and timing information on the forward control channel, without detecting errors.

4.5.1 Transmission Time Boundaries

Timing information that pertains to the population at large will be delivered in the Block Information Words that are present in each system configuration information (SCI) frame transmitted on a control channel. This information includes the reverse channel speed and the boundary between scheduled and random access slotted ALOHA transmissions on the reverse channel.

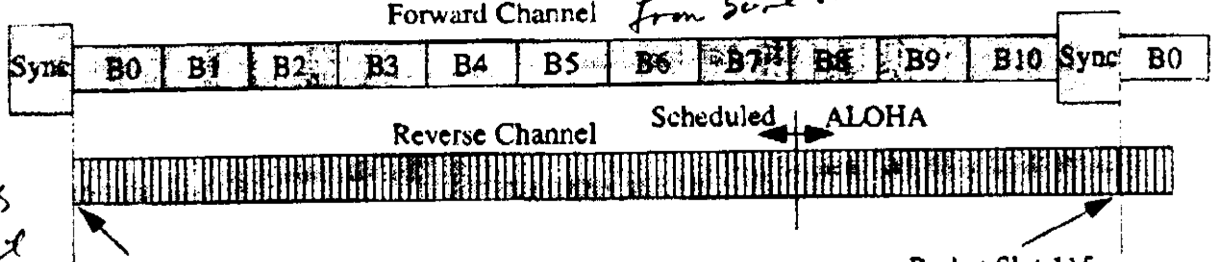
System timing and synchronization has the following properties:

- All packet slot times are referenced to the same starting point which is the start of Block 0 of every frame.
- Base receivers must be synchronized to the forward channel frame timing in order to determine the reverse channel packet slot timing. The base transmitters and base receivers must use a common timing reference. Synchronization using a GPS receiver is recommended (see Section 2.0 on page 15).

4.5.1.1 Reverse Channel Packet Timing

Example Slot Structure for 9600 bps Reverse Channel

(this figure is not to scale)



1.875 sec frame @ 16 ms per packet 116 packets 116

B0 and Packet Slot 0
Start at Same Time

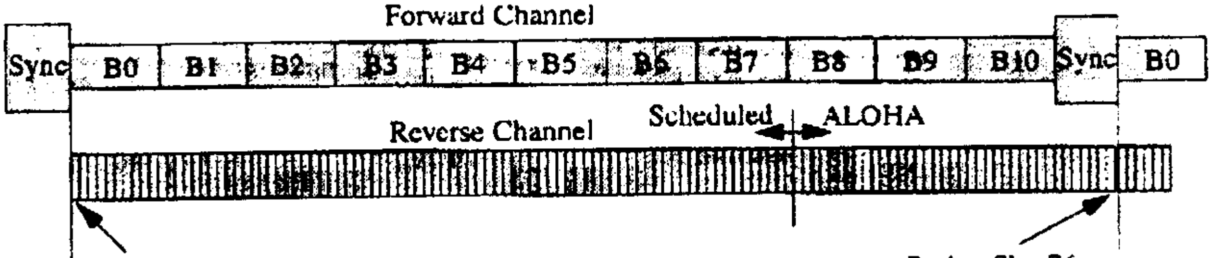
Packet Slot 115

Note: 1 Packet Slot = 154 bit times
= 16.0417 ms @ 9600 bps

14.17 ms 'left over'
before next B0

Example Slot Structure for 6400 bps Reverse Channel

(this figure is not to scale)



B0 and Packet Slot 0
Start at Same Time

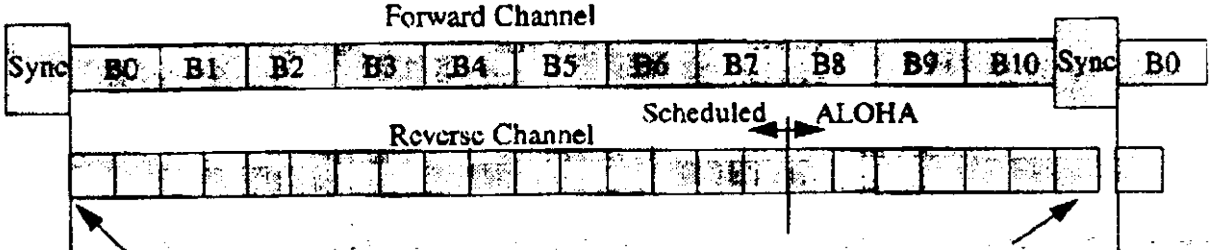
Packet Slot 76

Note: 1 Packet Slot = 154 bit times
= 24.0625 ms @ 6400 bps

22.19 ms 'left over'
before next B0

Example Slot Structure for 1600 bps Reverse Channel

(this figure is not to scale)



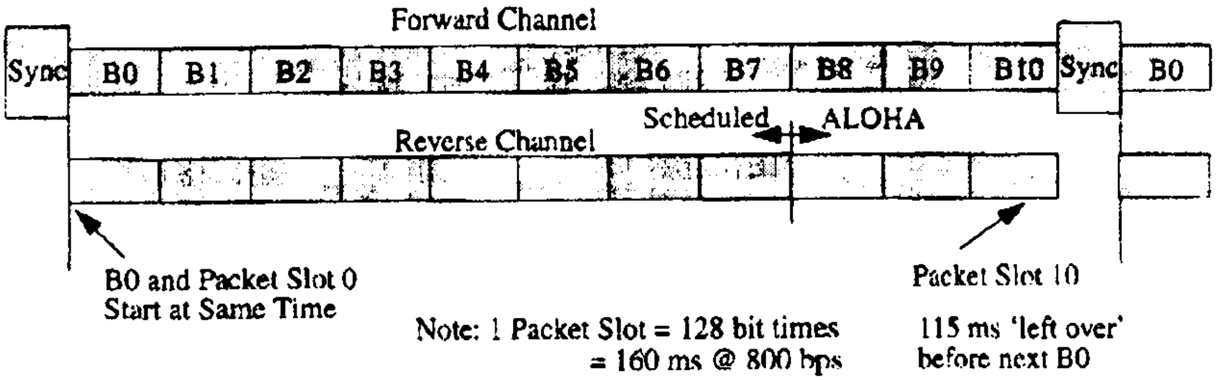
B0 and Packet Slot 0
Start at Same Time

Packet Slot 22

Note: 1 Packet Slot = 128 bit times
= 80 ms @ 1600 bps

35 ms 'left over'
before next B0

Example Slot Structure for 800 bps Reverse Channel
(this figure is not to scale)



Note that the reverse channel Block Information Words allow reverse channels to be controlled independently. A subscriber unit directed to use any one of the reverse channels available must use control information from the appropriate Block Information Words.

4.5.1.2 Boundary between Scheduled Messages and ALOHA

Transmissions from a subscriber unit must be either scheduled or ALOHA (random access). Separate reverse channel time intervals are allocated for these two different transmission types.

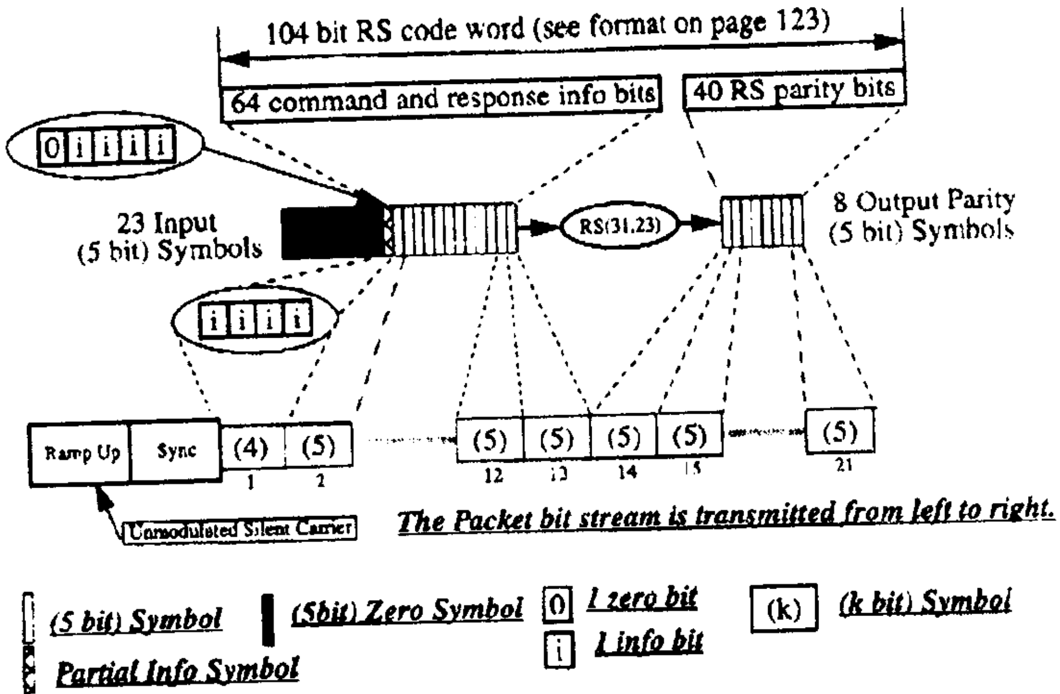
The 'ab' bits in the forward channel Block Information Words specify the number of packet slots allocated to scheduled messages during the following frames (see Section 3.7.6.19 on page 61). This count is relative to the start of Block 0 of the following frame and can have a value less than or equal to the number of packet slots present in that frame. The reverse channel can be assigned completely to ALOHA, completely to scheduled transmissions or any partitioning in between.

4.5.1.3 Reverse Channel Transmission Length

No reverse channel transmission may extend past the sync field of the following frame.

4.6 Command and Response Packet Construction

Command and response packets are self contained transmission entities that are made up of a ramp-up and synchronization pattern followed by a Reed-Solomon encoded information code word. The construction of command and response packets is illustrated in the figure below. A detailed description of how to calculate the Reed-Solomon parity bits is provided (see "Reed-Solomon Encoding" on page 155).



The code will always correct 4 or fewer bit errors and can correct up to 20 bit errors.

The packet is constructed as follows:

1. Append the 64 information bits to 51 zero bits forming 23 (5 bit) symbols. The first 10 symbols will therefore all be zeros.
2. Using the 23 symbols from (1) as input, generate 8 (5 bit) parity symbols with the RS(31,23) encoder (see Section 5.2.1 on page 155).
3. Append the 40 parity bits from (2), to the 64 information bits used in (1), to construct the code word.
4. Append the code word constructed in (3) to the Ramp Up and Sync pattern, to construct the packet.

The specific ramp up and sync pattern to be used depends on the speed of the reverse channel as is specified in the Block Information Words (see Section 3.7.6.15 on page 59). See Section 4.6.1 on page 119 for the ramp up and sync pattern to be used for the various reverse channel speeds.

The RS(31,23) decoder will correct any combination of Reed-Solomon symbol errors in this packet such that: 2 x (number of undetected 5 bit symbol errors) ≤ 8.