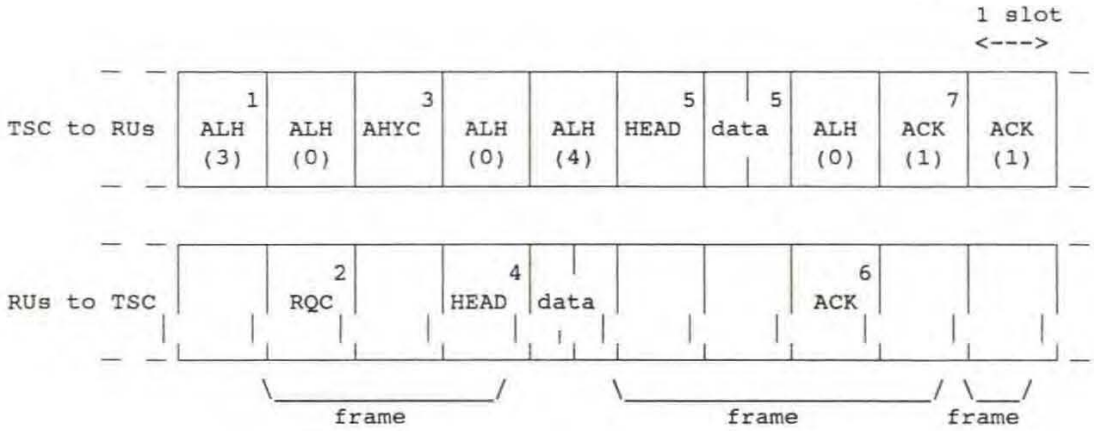

Example A message sequence on a control channel for sending a short data message from one radio unit to another radio unit on the same site. In this example, the data message comprises an address codeword and two appended data codewords.

1. ALH : General Aloha invitation (three-slot frame).

2. RQC : Random access request to transmit a short data message. (The request indicates the number of timeslots required for the data message: in this case, two slots.)

3. AHYC : Short data invitation message
   - acknowledges the RQC message
   - instructs the calling unit to send the data message in the next two slots
   - inhibits random access in the next slot.

4. HEAD + data : The calling radio unit sends its short data message to the TSC. In this example the message comprises an address codeword (HEAD) and two appended data codewords.

5. HEAD + data : The TSC forwards the short data message to the called radio unit.

   The second data codeword contains a flag (RSA) which is set to '0' to inhibit random access in the following slot, thus reserving the slot for a response from the called unit.

6. ACK : Acknowledgement ACK(QUAL=0) from the called radio unit - data message accepted.

7. ACK : Acknowledgement ACK(QUAL=0) sent to the calling unit to indicate that the called unit has accepted the data message. In this example the TSC immediately repeats the ACK message, for added reliability.

14.1 TSC Procedures for Short Data Messages

14.1.1 Responses to a short addressing RQC message

A radio unit requests to send a short data message by generating an RQC message, complying with the random access protocol. On receiving a short addressing RQC message (with EXT = 1, or with EXT = 0 and IDENT1 set to a valid called party ident), the TSC shall send one of the following responses:

a. ACKI(QUAL=1), ACKQ(QUAL=1), ACKX or ACKV, with PFIX/IDENT2 as the calling unit's individual address and IDENT1 as the called ident (or PABXI for a call to a PABX extension).

b. ACKT(QUAL=0), with PFIX/IDENT2 as the calling unit's individual address.

c. An AHYC message instructing the calling unit to send its data message.

For acceptable delay, see 7.2.4. See also 14.1.4 and 14.1.5.

14.1.2 Responses to an extended addressing RQC message

A radio unit requests to send a short data message by generating an RQC message, complying with the random access protocol. On receiving an extended addressing RQC message (with EXT = 0 and IDENT1 = IPFIXI, PSTNGI or PABXI), the TSC shall send one of the following responses:

a. ACKI(QUAL=1), ACKX or ACKV(QUAL=0), with the same prefix and idents as the RQC.

b. An AHYC message instructing the calling unit to send the full called address information.

c. An AHYC message instructing the calling unit to send its data message.

For acceptable delay, see 7.2.4. See also 14.1.3 to 14.1.5.

14.1.3 Instruction to send extended address information

After receiving an extended addressing RQC message, the TSC may demand the full called address (if appropriate), by sending the AHYC message with:

- the same prefix and idents as the RQC
  (i.e. IDENT1 set to IPFIXI, PSTNGI or PABXI as appropriate, and PFIX/IDENT2 set to the calling unit's address)
- DESC set to indicate the appropriate gateway (see 5.5.3.2.8)
- SLOTS set to correspond to the RQC
  (i.e. if IDENT1=PSTNGI and FLAG1=1 then SLOTS='10' else SLOTS='01').

The AHYC message instructs the calling unit to send the called party address information in the following SLOTS slot(s) (see 9.2.2.1). If the TSC does not successfully decode the address information, it may repeat the AHYC message or transmit ACKV(QUAL=0) to indicate failure of the transaction.

Note that, when the radio unit sends its short data message, it supplies the called address (prefix/ident) in the data message header. Therefore, for an interprefix call, the TSC need not demand the called address separately unless it is required for operational convenience.

14.1.4 Instruction to send the short data message

After receiving an RQC message, the TSC may demand the short data message from the calling radio unit by sending the AHYC message, with:

- IDENT1 set to SDMI
- PFIX/IDENT2 set to the calling unit's address
- DESC set to '000'
- SLOTS equal to SLOTS from the RQC.

The AHYC message instructs the calling unit to send its short data message in the following SLOTS slots (see 9.2.2.1). If the TSC does not successfully decode the short data message, it may repeat the AHYC message or transmit ACKV(QUAL=0) to indicate failure of the transaction.

Note that AHYC bars random access only in the first following return slot. When demanding a short data message, the TSC shall take appropriate action to reserve the subsequent return slot(s) if they are within a frame (e.g. by sending the AHY message with both idents set to DUMMYI).

14.1.5 Acknowledgements sent to indicate progress of RQC transaction

The TSC may send acknowledgement messages to indicate to a calling radio unit the progress of its short data transaction - for idents, see 5.5.2.1. (For an extended addressing call, acknowledgements ACKQ, ACKV(QUAL=1), ACKT(QUAL=0) and ACK(QUAL=0) are not appropriate until the called address has been obtained. Acknowledgements ACKQ(QUAL=0) and ACK(QUAL=0) are not appropriate until the short data message has been obtained.)

ACKI (QUAL=1)	-	Intermediate acknowledgement; more signalling to follow.
ACKQ (QUAL=0)	-	System is busy. Wait for further signalling.
ACKQ (QUAL=1)	-	Called party engaged. Wait for further signalling.
ACKX (QUAL=0)	-	Invalid call e.g. TSC does not support short data messages, or called party is not equipped to accept the message.
ACKX (QUAL=1)	-	System or called unit overload; message rejected.
ACKV (QUAL=0)	-	Called unit not in radio contact or transaction abandoned.
ACKV (QUAL=1)	-	Called party engaged (and TSC will not hold the request) or called unit does not wish to accept the message.
ACKT (QUAL=0)	-	Called party's data calls have been diverted.
ACK (QUAL=0)	-	Transaction has been successfully completed.

For maximum acceptable delay of repeats of acknowledgements ACKX, ACKV, ACKT and ACK, see time-out TB in 14.2.4.

14.1.6 Availability check on called radio unit

Before transmitting a short data message to a radio unit, the TSC may check that the unit is in radio contact (and suitably equipped). It uses the AHY message, with:

- bit POINT set to '0'
- bit CHECK set to '0'
- bit D set to '1'
- bit E set to '0'
- bit AD set to '0'
- PFIX/IDENT1 as the called unit's address
- IDENT2 set to SDMI.

The AHY message demands a response in the following slot from the called unit (see 9.2.2.2B).

The TSC may indicate the result of the availability check to a calling radio unit by sending appropriate acknowledgement(s) (see 14.1.5).

14.1.7 Informing called party

The TSC transmits a short data message to a radio unit, a group or all units in the system by sending the HEAD message on a control channel (see 5.6.2). The data message may have originated from the TSC itself, or from a radio unit (using RQC etc.), a line unit, a PABX extension or the PSTN.

The HEAD address codeword indicates the number of appended data codewords (up to four), and contains two 20-bit addresses: the called address and calling address (or gateway). The user data is contained in the data codewords. For an individually addressed short data message sent within a frame, the TSC shall set the RSA flag in the last data codeword (or in the "filler" data codeword) to '0', to inhibit random access in the next slot.

For an individually addressed short data message, the HEAD message demands a response from the called unit (see 14.3.1.1). If the response is ACK(QUAL=0), ACKX or ACKV(QUAL=1), the TSC may send appropriate acknowledgement(s) to a calling radio unit (see 14.1.5). If the TSC does not successfully decode a response, or if the response is ACKB(QUAL=1), it may repeat the HEAD message. If the called unit cannot be contacted, the TSC may indicate the failure to the calling unit by sending ACKV(QUAL=0).

For a short data message addressed to a group (or system-wide), the called units do not respond; the TSC may repeat the data message, to increase the probability of successful receipt. After transmitting the short data message, the TSC may send ACK(QUAL=0) to a calling radio unit.

14.1.8 Aborting the transaction

A calling radio unit may abort its short data transaction by generating an RQX message (see 5.5.3.1.3), complying with the random access protocol. On receiving an RQX message aborting a short data transaction, the TSC shall send a response: ACK(QUAL=1) with the same prefix and idents as the RQX.

14.1.9 TSC time-out

The TSC may operate a time-out on the maximum time for which it holds a short data message (for example, waiting for the called party to be free).

The TSC may instruct a calling radio unit to restart its waiting timer TJ or TW, by sending the AHY message with bit POINT set to '1'; see 9.1.1.7 and 9.2.2.3. If a time TJ or TW, minus the tolerance on the radio unit's timer, elapses since the last message it received for a short data transaction (from the calling unit), the TSC shall not send any further signalling for the transaction. See also 14.2.6.

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.