

TM8200 mobiles

MAP27
Implementation
Form
(Appendix A7)



This implementation form is based on appendix A7 of the “MAP27 Mobile Access Protocol for MPT 1327 equipment” version 1.5. It describes how the TM8200 implementation complies and varies with that specified by the protocol, and must be read in conjunction with the MAP27 protocol document. Each heading in this document begins with a reference to appendix A7 (for example, A7.1), and other sections of the protocol are referenced throughout this document, usually in parentheses (for example, 5.2.2.4.1). Documentation for integrators, including the MAP27 protocol, is available for download from the Support section of the Tait Electronics Ltd web site. See “[Tait Contact Information](#)” on page 11.

This form consists of three major parts:

1. General information about the product identification (A7.1.), the physical interface (A7.2.), and the data link layer parameters (A7.3.), and
2. The network layer messages used in the product (A7.4.), and
3. Additional information about network layer messages used in the product (A7.5.).

MAP27 is enabled on the radio at programming time, using the Data form > MAP27 tab > MAP27 Enabled field. You cannot enable both MAP27 and the computer controlled data interface (CCDI) at the same time. The radio must be in trunked mode to access MAP27 functionality.

A7.1. Product identification

Product identification:	TM8200 dual-mode (v2.05 or higher)		
Manufacturer:	Tait Electronics Ltd		
Date:	September 2005	Protocol version number:	1.5

A7.2. Physical interface

The transmission speed (3.4) is selectable at programming time using the Data form > MAP27 tab > Baud Rate field.

9600 bit/s:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1200 bit/s:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Others:	19200 bit/s
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There are three ports available for MAP27 asynchronous serial communication with the TM8200. Only one of these ports can be used for MAP27 transmission and reception. The port is selectable at programming time using the Data form > MAP27 tab > MAP27 Port field.

The options are:

- Microphone connector. Select the “Mic” programming option.
- Auxiliary connector. Select the “Aux” programming option.
- Internal options connector. Select the “Internal Options” programming option.

A7.3. Data link layer

The radio supports two modes of data link layer, which are selectable at programming time using the Data form > MAP27 tab > Link Layer Type field. The two modes are:

1. Binary link layer mode. This is the standard mode of operation as prescribed by MAP27. This is enabled by selecting the “Full” programming option. See [“Full Mode” on page 5](#).
2. ASCII link-layer less mode. This is a proprietary mode of operation which is enabled by selecting the “ASCII” programming option. See [“ASCII mode”](#) below.

ASCII mode

In this mode of operation there is no link layer. Messages are sent between the radio and data terminal equipment (DTE) as ASCII representations of the network layer messages. There is no error detection at the link layer level and no acknowledgement of received messages. This allows operation with a terminal program such as HyperTerminal.

If the radio receives a network layer message that it cannot process, the radio will reply with a “Protocol Information” message (starting with ASCII value B4hex).

When sending messages from the DTE to the radio, the message must be terminated with a carriage return character (ASCII value 0Dhex) or # (ASCII value 23hex). Each of these characters is recognised by the radio as the message terminator and provides the stimulus for the radio to process the received message.

Messages sent from the radio to the DTE are terminated with a carriage return character (ASCII value 0Dhex).

The maximum message size for ASCII mode (the parameter for the maximum number of octets) is the same as for Full mode. See [“Maximum length” on page 5](#).

The following tables show examples of messages to and from the radio while using ASCII mode. A reference with “A7” refers to a section in this document, and other references refer to the MAP27 protocol document v1.5. Alpha characters may be in upper or lower case.

Examples of DTE to Radio

String	Description	Reference
A40100020008	Set up call (A4hex) to prefix 001 (01hex) and ident 0002 (0002hex), with DUMMYI (00hex), and call details: non-include, individual, voice, and non-priority (00001000bin, 08hex).	5.2.2.4.1, A7.5.6.
A40117840020	Set up call (A4hex) to prefix 001 (01hex) and ident 6020 (1784hex), with DUMMYI (00hex), and call details: non-include, broadcast group, voice, and priority (0100000bin, 20hex).	5.2.2.4.1, A7.5.6.
807F139D001C	Send status (80hex) to prefix 127 (7F hex) and ident 5021 (139D hex), with DUMMYI (00hex), and status number 28 (1Chex).	5.2.2.1.1
810101EE00B7 6869	Send SST (81hex) to prefix 001 (01hex) and ident 0494 (01EEhex), with DUMMYI (00hex), using MPT 1343 CCITT Alphabet No. 5 (1011bin, Bhex), with 7 bits in the last byte (7hex), and message “hi” (6869hex).	5.2.2.2.1
A40112020018	Set up call (A4hex) to prefix 001 (01hex) and ident 4610 (1120hex), with DUMMYI (00hex), and call details: non-include, individual, NPD data, and non-priority (0011000bin, 18hex).	5.2.2.4.1, A7.5.6.
B000	Interrogate radio (B0hex): personality request (00hex).	5.2.2.8.1
B60201	Volume control (B6hex) for indicator tones (02hex), set to low level (01hex).	5.2.2.8.10, A7.5.24.
B60173	Volume control (B6hex) for audio speech (01hex), set to mid value in range (73hex).	5.2.2.8.10, A7.5.24.
B7B49F	Dial string (B7hex), with * (Bhex) and “do not disturb” (49BCD), and required final value (Fhex).	A7.5.30.
B7C49F	Dial string (B7hex), with # (Chex) and “do not disturb” (49BCD), and required final value (Fhex).	A7.5.30.
B7494CF	Dial string (B7hex) to set up call to radio unit 494 (494BCD) and # (Chex), with required final value (Fhex).	A7.5.30.

Examples of Radio to DTE

Response	Description	Reference
B401	Protocol info (B4hex): unrecognised message (01hex).	5.2.2.8.9
B402	Protocol info (B4hex): facility or addressing not supported (02hex).	5.2.2.8.9
B403	Protocol info (B4hex): protocol state mismatch (03hex).	5.2.2.8.9
A40100020008	Call received (A4hex) from prefix 001 (01hex) and ident 0002 (0002hex), with DUMMYI (00hex), and call details: non-include, individual, voice, and non-priority (00001000bin, 08hex).	5.2.2.4.4
B206C108	Radio operating condition (B2hex), returned as a result of B003. Radio unit is in radio contact, is off hook, and is not transmitting (0110bin, 06hex), has a field strength of -62dBm (C1hex), and call duration time of 12 minutes (08hex).	5.2.2.8.5, A7.5.20.
807F139D000E	Status received (80hex) from prefix 127 (7Fhex) and ident 5021 (139Dhex), with DUMMYI (00hex), and status number 14 (0Ehex).	5.2.2.1.2
C00101EE0000	Acknowledgement received (C0hex) from prefix 001 (01hex) and ident 0494 (01EEhex), with DUMMYI (00hex), and successful transaction (00hex).	5.2.2.1.3

Full Mode

The following parameters apply to the operation of the full binary link layer mode.

Maximum length (4.3.2.1): N1: ⁿoctet: octets

Maximum window size (4.3.2.1): k:

Acknowledgement request (4.3.2.3): AR: variable set to '0' set to '1'

Link establishment timer (4.4.1.1): T0: s

Transfer phase retry timer (4.4.2.1): T1: s

Acknowledgement timer (4.4.2.2): T2: s

Activity timer (4.4.2.3): T3: s

Retransmission count (4.4.2.6): N2:

Link failure detection time (4.4.2.6): T4: s

Activity count (4.4.2.6): N3:

A7.4. Network layer messages

The "Note" columns of the network layer messages indicate whether the equipment complies or does not comply with the standard.

Code (Hex)	Code (Bin)	D->R	Note ^a	R->D	Note ^a
00	00000000	Hook to other protocols	N	Hook to other protocols	N
01	00000001	Radio Test	N	Radio Test Result	N
02	00000010	PAI CFCC	A		
03	00000011	PAI SFC	A	PAI RC	A
04	00000100	PAI Flow Control	A	PAI Flow Control	A
05	00000101			Diagnostic Output	A
80	10000000	Send Status	S	Receive Status	S
81	10000001	Send SST	S	Receive SST	S
82	10000010	Send MST	S	Receive MST	S
86	10000110	Disconnect (normal end)	S	Cleared (normal end)	S
87	10000111	Diversion Request	S		
A3	10100011	Send Modem Data	A	Receive Modem Data	A
A4	10100100	Setup Voice/Modem Call	A	Incoming Voice/Modem Call	S
A5	10100101	Setup Emergency Voice/Modem Call	S	Incoming Emergency Voice/Modem Call	S
A6	10100110	Disconnect (cancel attempt)	S	Cleared (abnormal end)	S
A7	10100111	Diversion Cancel	S		
B0	10110000	Radio Interrogation	S	Radio Personality	S
B1	10110001			Numbering Information	S
B2	10110010	Radio Control	S	Operating Condition	A
B3	10110011	Radio Management	S	Radio Settings	S
B4	10110100	Protocol Info	S	Protocol Info	S
B5	10110101	Manual Hunt	A	Network Information	S
B6	10110110	Volume Control	A		
B7	10110111	Dialled String	A		
C0	11000000			Status, SST and MST ACK (positive)	S
C1	11000001			TDP ACK (positive)	A
C4	11000100			Setup Progress (positive)	S
C5	11000101			Receive Progress (positive)	S
C7	11000111			Diversion ACK (positive)	S
D0	11010000			Status, SST and MST ACK (queuing)	S
D1	11010001			TDP ACK (queuing)	A
D4	11010100			Setup Progress (queuing)	S
D5	11010101			Receive Progress (warning)	S
E0	11100000			Status, SST and MST ACK (negative)	S
E1	11100001			TDP ACK (negative)	A
E4	11100100			Setup Progress (negative)	S
E5	11100101			Receive Progress (no connection)	S
E7	11100111			Diversion ACK (negative)	S

a. S = supported, N = not supported at all, A = additional information, see A7.5

A7.5. Additional Network layer Information

A mark in a box in front of a row indicates that the radio does not comply with that option or complies in a different way to that specified.

A7.5.6. SETUP VOICE / SETUP MODEM (5.2.2.4.1.)

As per the MAP27 protocol, except for the proprietary “conference data call request” option.

CALL DETAILS:

	8	7	6	5	4	3	2	1		
	0								Non-include call	
	1								Include call	
	0								Individual or group call, called user(s) may reply	
	1								Group call, called users are not allowed to reply	
	0								Voice call	
	1								Modem (data) call	
	0								High priority call	
	1								Non-priority call	
							0	0	0	Standard call
•	0	0	1		0	0	1		Conference data call request (proprietary)	

The “conference data call request” option is used to instruct the radio to not expect acknowledgements to transmitted Tait data protocol (TDP) data packets for a group conference data call. If this is not used for a group conference data call, the call will be cleared prematurely due to lack of receipt of acknowledgement of the transmitted data packet.

A7.5.20. OPERATING CONDITION (5.2.2.8.5.)

Details of the relationship between field strength value and dBm value are given below.

FIELD STRENGTH:

	0	0	0	0	0	0	0	0	Field strength not available
•	0	0	0	0	0	0	0	1	-254dBm
•	1	1	1	1	1	1	1	1	0dBm
	Others								Range between -253dBm and -1dBm

A7.5.24. VOLUME CONTROL (5.2.2.8.10.)

The radio supports changing of speech audio volume fully, and indicator level to high or low. Modem audio level is automatically derived in the radio, and manual variation of it via MAP27 is not supported.

CONTROL POINT:

	8	7	6	5	4	3	2	1	
•								1	Not supported
								1	Indicator tones
								1	Normal speech audio path

VOLUME SET - INDICATOR TONES:

•	0	0	0	0	0	0	0	1	High level
•	0	0	0	0	0	0	1	0	Low Level
•	0	0	0	0	0	0	1	1	Low Level
•	*	*	*	*	0	0	1	1	Value range 1...15 - High level
•	0	0	0	0	0	1	0	0	Not supported
•	0	0	0	0	0	1	0	1	Not supported

VOLUME SET - AUDIO SPEECH PATH:

	0	0	0	0	0	0	0	1	Up
	0	0	0	0	0	0	1	0	Down
	*	*	*	*	0	0	1	1	Set to value in range 0...15, '0' is the lowest audio volume
•	0	0	0	0	0	1	0	0	Not supported
•	0	0	0	0	0	1	0	1	Not supported

A7.5.25. DIAGNOSTIC MODE MESSAGES (proprietary)

Message types 02, 03, 04 and 05 (hex).

These proprietary messages carry data between the radio and DTE when the radio is operating in a diagnostic mode. These modes are intended for factory use only and hence details of the messages are not published.

A7.5.26. SITE SELECT MESSAGE (proprietary)

The data terminal equipment (DTE) sends this message to the radio to instruct it to perform a site select operation. This causes the radio to select a single channel as a control channel and attempt to acquire it. This form of the message is equivalent to *50 operation from the keypad.

When a control channel has been successfully acquired in this way calls may be made as normal. The radio will obey "go to channel" (GTC) commands and participate in traffic channel calls normally, but will always return to the selected control channel at the end of the call. It will not attempt to acquire any other control channel even if service is lost.

If acquisition is unsuccessful, the radio stays on this channel and normal hunting processes are suspended. In this case the radio will indicate “no service”.

The message can also be used to instruct the radio to return to normal hunting processes. This also has the effect of clearing out the registration records and forcing the radio to re-hunt. This form of the message is equivalent to #50 operation from the keypad.

	8	7	6	5	4	3	2	1	
1	1	0	1	1	0	1	0	1	Message type
2	R	0	0	0	0	0	CHa		R bit 1 = Resume hunting processes. CHa = 2 most-significant bits (MSB) of channel number
3	CHb								8 least-significant bits (LSB) of channel number

“R bit” is set to resume the normal hunting processes. In this case the rest of the data is ignored.

If “R bit” is clear, the radio will attempt to acquire the channel number contained in CHa and CHb.

A7.5.27. TAIT DATA PROTOCOL STATUS MESSAGE (proprietary)

The radio sends this message to the data terminal equipment (DTE) to acknowledge that the receiving radio has received the previous Tait data protocol (TDP) packet, or indicate the reason for an unsuccessful attempt.

	8	7	6	5	4	3	2	1	
1	1	1	*	*	0	0	0	1	Message type
2	CAUSE								Reason for sending this message

CAUSE for Message type C1h:

	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	0	0	Successful transaction

CAUSE for Message type D1h:

	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	1	0	Data packet queued

CAUSE for Message type E1h:

	8	7	6	5	4	3	2	1	
	0	0	0	0	0	0	0	1	TDP format mismatch
	0	0	0	0	0	0	1	0	Internal modem failure
	0	0	0	0	0	1	0	0	Data channel failure
	0	0	0	0	1	0	0	0	Invalid data packet size
	0	0	0	1	0	0	0	0	Data channel timeout
	0	0	1	0	0	0	0	0	Modem busy
	0	1	0	0	0	0	0	0	Transaction aborted
	1	0	0	0	0	0	0	0	MAP27 link layer failure

A7.5.28. TAIT DATA PROTOCOL SEND MODEM DATA

This message carries user data and is sent by the DTE to the radio during a TDP call.

	8	7	6	5	4	3	2	1	
1	1	0	1	0	0	0	1	1	Message type
2..	USER DATA								Free format user data

A7.5.29. TAIT DATA PROTOCOL RECEIVE MODEM DATA

This message carries user data and is sent by the radio to the DTE during a TDP call.

	8	7	6	5	4	3	2	1	
1	1	0	1	0	0	0	1	1	Message type
2..	USER DATA								Free format user data

A7.5.30. DIALLED STRING

The data terminal equipment (DTE) sends this message to the radio to initiate dialled actions according to MPT 1343.

Any function that can be accessed by dialling BCD numeric values (plus hex representations of * and #) using the keypad can be accessed by this message, including call-setups. This differs from the MAP27 protocol, which prescribes that call set-ups shall not be supported by using this message.

In this message * is represented by the hex value B, and # is represented by the hex value C.

An unused location in the last octet must be padded with the hex value F.

For example to dial *49, the dialled string message is B7B49F (letters may be upper or lower case).

	8	7	6	5	4	3	2	1	
1	1	0	1	1	0	1	1	1	Message type
2..	DIALLED DIGITS								Characters used for dialling actions

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Tait Contact Information

Tait Radio Communications Corporate Head Office

Tait Electronics Ltd, P.O. Box 1645, Christchurch, New Zealand
For the address and telephone number of regional offices, refer to the Tait-World website:

Website: <http://www.taitworld.com>

Technical Support

For assistance with specific technical issues, contact Technical Support:

E-mail: support@taitworld.com

Website: <http://support.taitworld.com>