



# R2 Signaling Tones and Pulse Code Modulation Line Signaling

This chapter describes the R2 signaling tones generated and detected by the MFCR2 transceiver cards, and the R2 pulse code modulation (PCM) 2-bit line signaling transmitted and received by E1 spans.

## Forward and Backward Signaling Tones

Table 2-1 through Table 2-4 provide R2 signaling information based on ITU Q.441 as it applies specifically to the Mexico country feature package.

*Table 2-1 R2 Signaling Group I Forward Signals*

| Token Data Field | Designation | Frequencies    | Meaning  |
|------------------|-------------|----------------|--|
| 1                | G-I-1       | 1380 + 1500 Hz | Digit 1  |
| 2                | G-I-2       | 1380 + 1620 Hz | Digit 2  |
| 3                | G-I-3       | 1500 + 1620 Hz | Digit 3  |
| 4                | G-I-4       | 1380 + 1740 Hz | Digit 4  |
| 5                | G-I-5       | 1500 + 1740 Hz | Digit 5  |
| 6                | G-I-6       | 1620 + 1740 Hz | Digit 6  |
| 7                | G-I-7       | 1380 + 1860 Hz | Digit 7  |
| 8                | G-I-8       | 1500 + 1860 Hz | Digit 8  |
| 9                | G-I-9       | 1620 + 1860 Hz | a) Digit 9<br>b) Access to long distance system<br>c) Transit indication |
| 10               | G-I-10      | 1740 + 1860 Hz | a) Digit 0<br>b) Access to special service                               |
| 11               | G-I-11      | 1380 + 1980 Hz | Not applicable   |
| 12               | G-I-12      | 1500 + 1980 Hz | Not applicable   |
| 13               | G-I-13      | 1620 + 1980 Hz | Not applicable   |
| 14               | G-I-14      | 1749 + 1980 Hz | Not applicable   |
| 15               | G-I-15      | 1860 + 1980 Hz | Not applicable   |

*Table 2-2 R2 Signaling Group II Forward Signals*

| Token Data Field | Designation | Frequencies    | Meaning                              |
|------------------|-------------|----------------|--------------------------------------|
| 1                | G-II-1      | 1380 + 1500 Hz | Not applicable                       |
| 2                | G-II-2      | 1380 + 1620 Hz | Ordinary subscriber without priority |
| 3                | G-II-3      | 1500 + 1620 Hz | Public phone                         |
| 4                | G-II-4      | 1380 + 1740 Hz | Time and cost                        |
| 5                | G-II-5      | 1500 + 1740 Hz | Not applicable                       |
| 6                | G-II-6      | 1620 + 1740 Hz | Not applicable                       |
| 7                | G-II-7      | 1380 + 1860 Hz | Long distance public phone           |
| 8                | G-II-8      | 1500 + 1860 Hz | Not applicable                       |
| 9                | G-II-9      | 1620 + 1860 Hz | Not applicable                       |
| 10               | G-II-10     | 1740 + 1860 Hz | Not applicable                       |
| 11               | G-II-11     | 1380 + 1980 Hz | Not applicable                       |
| 12               | G-II-12     | 1500 + 1980 Hz | Not applicable                       |
| 13               | G-II-13     | 1620 + 1980 Hz | Not applicable                       |
| 14               | G-II-14     | 1740 + 1980 Hz | Not applicable                       |
| 15               | G-II-15     | 1860 + 1980 Hz | Not applicable                       |

*Table 2-3 R2 Signaling Group A Backward Signals*

| Token Data Field | Designation | Frequencies    | Meaning  |
|------------------|-------------|----------------|--|
| 1                | A-1         | 1140 + 1020 Hz | Send next digit ( $n+1$ )                                    |
| 2                | A-2         | 1140 + 900 Hz  | Start from first digit                                       |
| 3                | A-3         | 1020 + 900 Hz  | Number complete; change over to reception of Group B signals |
| 4                | A-4         | 1140 + 780 Hz  | Network congestion   |
| 5                | A-5         | 1020 + 780 Hz  | Not applicable   |
| 6                | A-6         | 900 + 780 Hz   | Send Group II signal and change to Group C signals           |
| 7                | A-7         | 1140 + 660 Hz  | Not applicable   |
| 8                | A-8         | 1020 + 660 Hz  | Not applicable   |
| 9                | A-9         | 900 + 660 Hz   | Not applicable   |
| 10               | A-10        | 780 + 660 Hz   | Not applicable   |
| 11               | A-11        | 1140 + 540 Hz  | Not applicable   |
| 12               | A-12        | 1020 + 540 Hz  | Not applicable   |
| 13               | A-13        | 900 + 540 Hz   | Not applicable   |

*Table 2-3 R2 Signaling Group A Backward Signals (continued)*

| Token Data Field | Designation | Frequencies  | Meaning        |
|------------------|-------------|--------------|----------------|
| 14               | A-14        | 780 + 540 Hz | Not applicable |
| 15               | A-15        | 660 + 540 Hz | Not applicable |

*Table 2-4 R2 Signaling Group B Backward Signals*

| Token Data Field | Designation | Frequencies    | Meaning               |
|------------------|-------------|----------------|-----------------------|
| 1                | B-1         | 1140 + 1020 Hz | Free with charging    |
| 2                | B-2         | 1140 + 900 Hz  | Busy                  |
| 3                | B-3         | 1020 + 900 Hz  | Not applicable        |
| 4                | B-4         | 1140 + 780 Hz  | Blocking              |
| 5                | B-5         | 1020 + 780 Hz  | Free without charging |
| 6                | B-6         | 900 + 780 Hz   | Not applicable        |
| 7                | B-7         | 1140 + 660 Hz  | Not applicable        |
| 8                | B-8         | 1020 + 660 Hz  | Not applicable        |
| 9                | B-9         | 900 + 660 Hz   | Not applicable        |
| 10               | B-10        | 780 + 660 Hz   | Not applicable        |
| 11               | B-11        | 1140 + 540 Hz  | Not applicable        |
| 12               | B-12        | 1020 + 540 Hz  | Not applicable        |
| 13               | B-13        | 900 + 540 Hz   | Not applicable        |
| 14               | B-14        | 780 + 540 Hz   | Not applicable        |
| 15               | B-15        | 660 + 540 Hz   | Not applicable        |

*Table 2-5 R2 Signaling Group C Backward Signals*

| Token Data Field | Designation | Frequencies    | Meaning                           |
|------------------|-------------|----------------|-----------------------------------|
| 1                | C-1         | 1140 + 1020 Hz | Send next number of Subscriber A  |
| 2                | C-2         | 1140 + 900 Hz  | Send first digit BNUM             |
| 3                | C-3         | 1020 + 900 Hz  | Send Group II and Group B signals |
| 4                | C-4         | 1140 + 780 Hz  | Congestion                        |
| 5                | C-5         | 1020 + 780 Hz  | Send next digit BNUM              |
| 6                | C-6         | 900 + 780 Hz   | Repeat last digit BNUM            |
| 7                | C-7         | 1140 + 660 Hz  | Not applicable                    |
| 8                | C-8         | 1020 + 660 Hz  | Not applicable                    |

*Table 2-5 R2 Signaling Group C Backward Signals (continued)*

| Token Data Field | Designation | Frequencies   | Meaning        |
|------------------|-------------|---------------|----------------|
| 9                | C-9         | 900 + 660 Hz  | Not applicable |
| 10               | C-10        | 780 + 660 Hz  | Not applicable |
| 11               | C-11        | 1140 + 540 Hz | Not applicable |
| 12               | C-12        | 1020 + 540 Hz | Not applicable |
| 13               | C-13        | 900 + 540 Hz  | Not applicable |
| 14               | C-14        | 780 + 540 Hz  | Not applicable |
| 15               | C-15        | 660 + 540 Hz  | Not applicable |

## Pulse Code Modulation Line Signaling

Table 2-6 describes the 2-bit, channel-associated PCM line signaling used by VCO systems equipped with E1 interface cards. Forward signals are used by originating or outgoing ports, while backward signals are generated by incoming ports. For more information on E1 cards, refer to the *Cisco VCO/4K Card Technical Descriptions*.

*Table 2-6 R2 Pulse Code Modulation Line Signaling*

| Signal                         | Exchange Signaling |    |          |    |
|--------------------------------|--------------------|----|----------|----|
|                                | Forward            |    | Backward |    |
|                                | Af                 | Bf | Ab       | Bb |
| Idle                           | 1                  | 0  | 1        | 0  |
| Seize                          | 0                  | 0  | 1        | 0  |
| Seize acknowledge              | 0                  | 0  | 1        | 1  |
| Clear forward before answer    | 1                  | 0  | 1        | 1  |
| Release guard                  | 1                  | 0  | 1        | 0  |
| Seizure acknowledge            | 0                  | 0  | 1        | 1  |
| Answer                         | 0                  | 0  | 0        | 1  |
| Clear forward after answer     | 1                  | 0  | 0        | 1  |
| Release guard                  | 1                  | 0  | 1        | 0  |
| Clear-back                     | 0                  | 0  | 1        | 1  |
| Clear forward after clear-back | 1                  | 0  | 1        | 1  |
| Release guard                  | 1                  | 0  | 1        | 0  |
| Blocking                       | 1                  | 0  | 1        | 1  |
| Unblocking                     | 1                  | 0  | 0        | 0  |