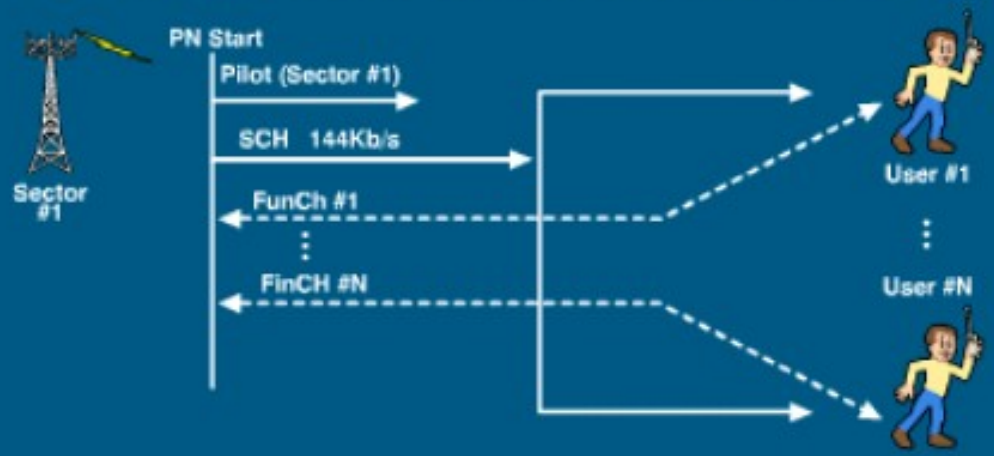
CDMA2000
New Channels

CDMA2000 RADIO TECHNOLOGY
UNIT LESSONS

- CDMA2000 Forward Radio Carrier (Downlink)
  - Pilot, Sync, Paging, and Fundamental Channels
  - Supplemental Channels
    - Packet Mode Operation
      - Configuration and Data Rate Options
  - Multi-Carrier Operation
- CDMA2000 Reverse Radio Carrier (Uplink)
- CDMA2000 Evolution to 1xEV-DO and 1xEV-DV

SUPPLEMENTAL CHANNELS
REQUIRE FUNDICATED CHANNELS

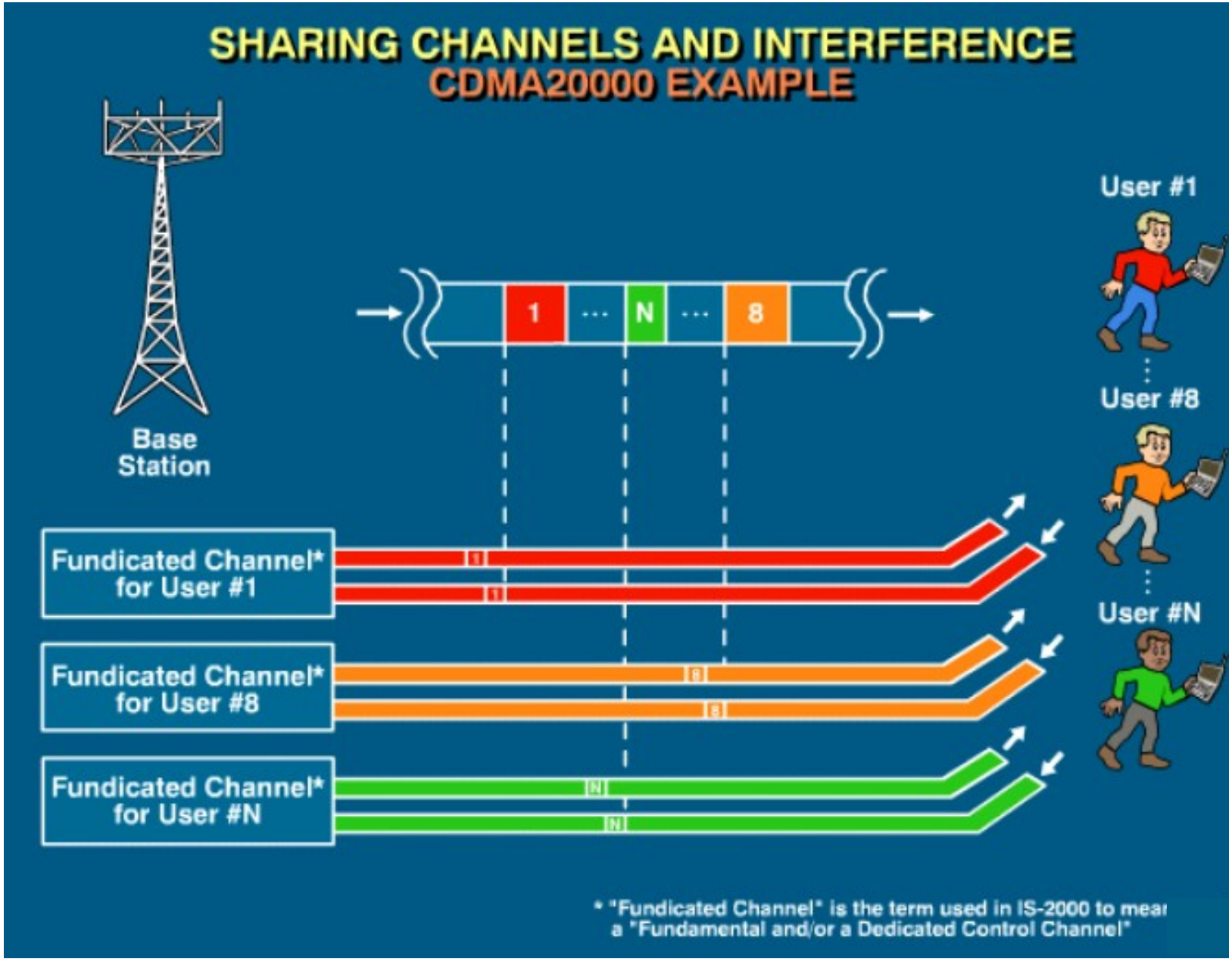


A "Fundicated Channel" (i.e. a FCH and /or a DCCH) is ALWAYS required*

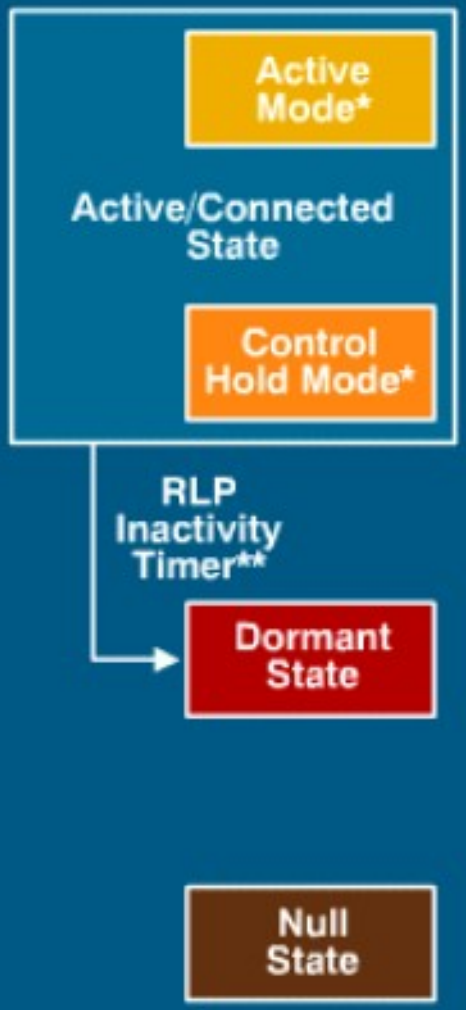
- To maintain a continuous signal at the Base Station
- So that accurate power measurements can be made...
- For accurate and fast Handset Power Control...
- Even for the Supplemental Channel with bursty data

CCH = Common CHannel
DCCH = Dedicated Control CHannel
FCH = Fundamental Channel
FunCH = Fundicated Channel

*A Dedicated Control Channel is sometimes used instead of or together with the Fundamental Channel for improved Packet Data Medium Access Control (MAC)


SHARING CHANNELS AND INTERFERENCE
CDMA20000 EXAMPLE
Base Station
1
N
8
User #1
User #8
User #N
Fundicated Channel* for User #1
Fundicated Channel* for User #8
Fundicated Channel* for User #N
* "Fundicated Channel" is the term used in IS-2000 to mean a "Fundamental and/or a Dedicated Control Channel"

PACKET DATA ON A DEDICATED RADIO CHANNEL
EXAMPLE: CDMA2000



- SCH is active and allocated to me
- My dedicated FunCH is active and transferring data
- Packet Data Service is active

- SCH may be active but temporarily allocated to another user
- My dedicated FunCH is active and may transfer signaling or data, if needed

- Packet Data Service is active
- SCH is released
- My dedicated FunCH is released but . . .
- The system REMEMBERS all the information necessary to re-activate QUICKLY! . . . maintaining a "virtual active" state

- PPP state is maintained by the mobile and PDSN
- The System "releases" the Packet Data Service

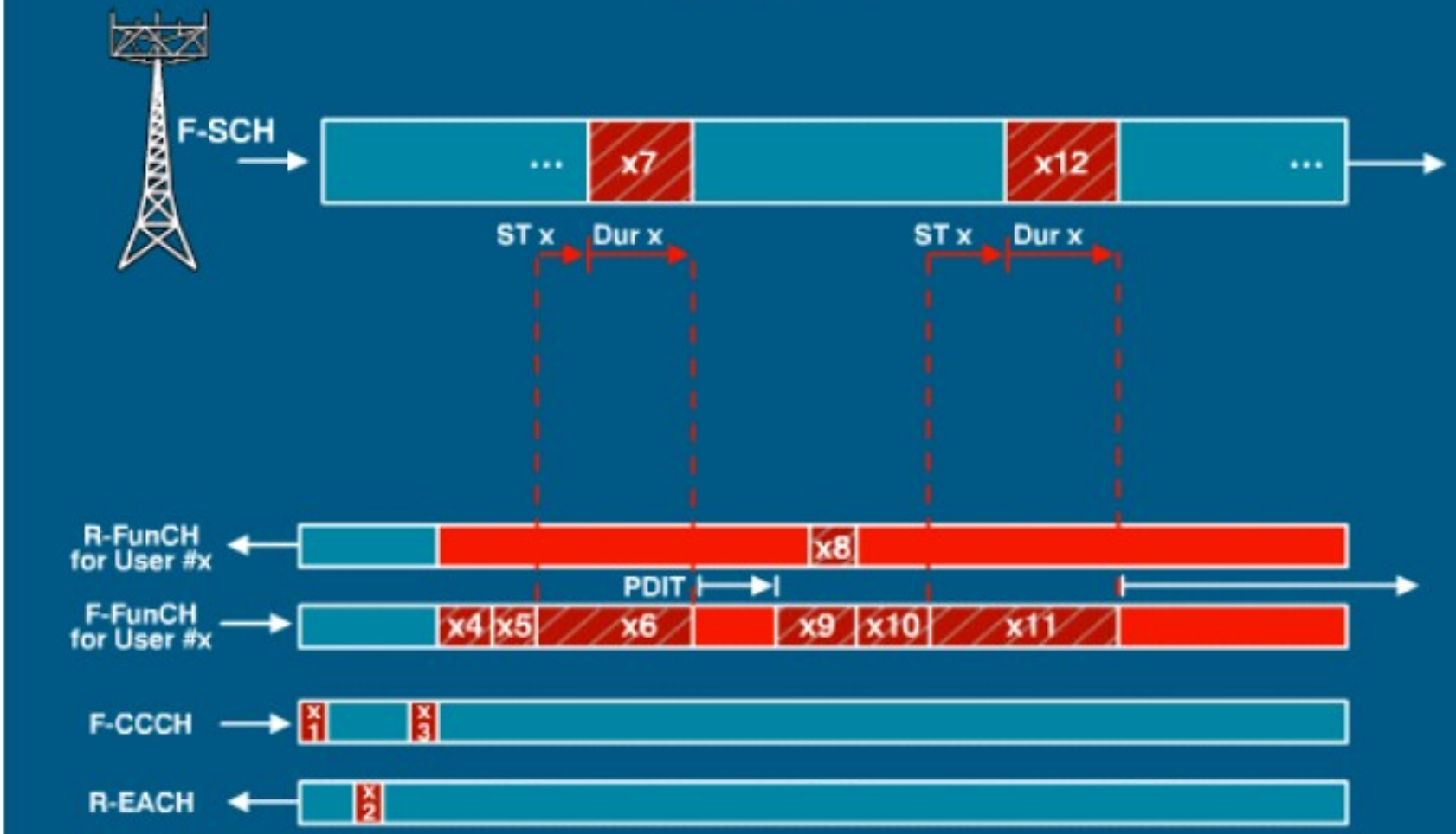
DCCH = Dedicated Control Channel
FCH = Fundamental Channel
PDSN = Packet Data Serving Node

PPP = Point-to-Point Protocol
RLP = Radio Link Protocol
SCH = Supplemental Channel

*Ref: IS-2000.5-A Section 2.6.4.3
**Minimum Value = 20 sec

Source: IS-2001 Inter-Operability Specification Section 2.14

FORWARD SCH ALLOCATION: ONE USER EXAMPLE



PDIT = Packet Data Inactivity Timer
SCH = Supplemental Channel
FunCH = Fundicated Channel
CCCH = Common Control Channel
EACH = Enhanced Access Channel
DCH = Dedicated Control Channel
ST = Start Time
DUR = Duration
= Scrambled with Long Code Mask for User #x

FORWARD SCH ALLOCATION
MAJOR STEPS IN THE SEQUENCE (1)

1. BS sends "Page Message" on the common F-CCCH to alert the user to incoming packets

2. User sends "Page Response Message" on the common R-EACH

3. BS sends "Extended Channel Assignment Message", assigning dedicated F/R-FunCH

4. BS begins transmitting packet data on F-FunCH

5. When its buffer exceeds a preset threshold, BS sends "Extended Supplemental Channel Assignment Message", including
   - Start Time (ST)
   - Duration (Dur)

BS = Base Station
DCCH = Dedicated Control Channel
EACH = Enhanced Access Channel
CCCH = Common Control Channel
F/R = Forward/Reverse
FunCH = Fundicated Channel

FORWARD SCH ALLOCATION
MAJOR STEPS IN THE SEQUENCE (2)

6. BS resumes data transmission on F-FCH*

7. BS transmits data on F-SCH at time indicated by "ST" for duration "Dur"
   - Packet Data Inactivity Timer (PDIT) is set when buffer is empty

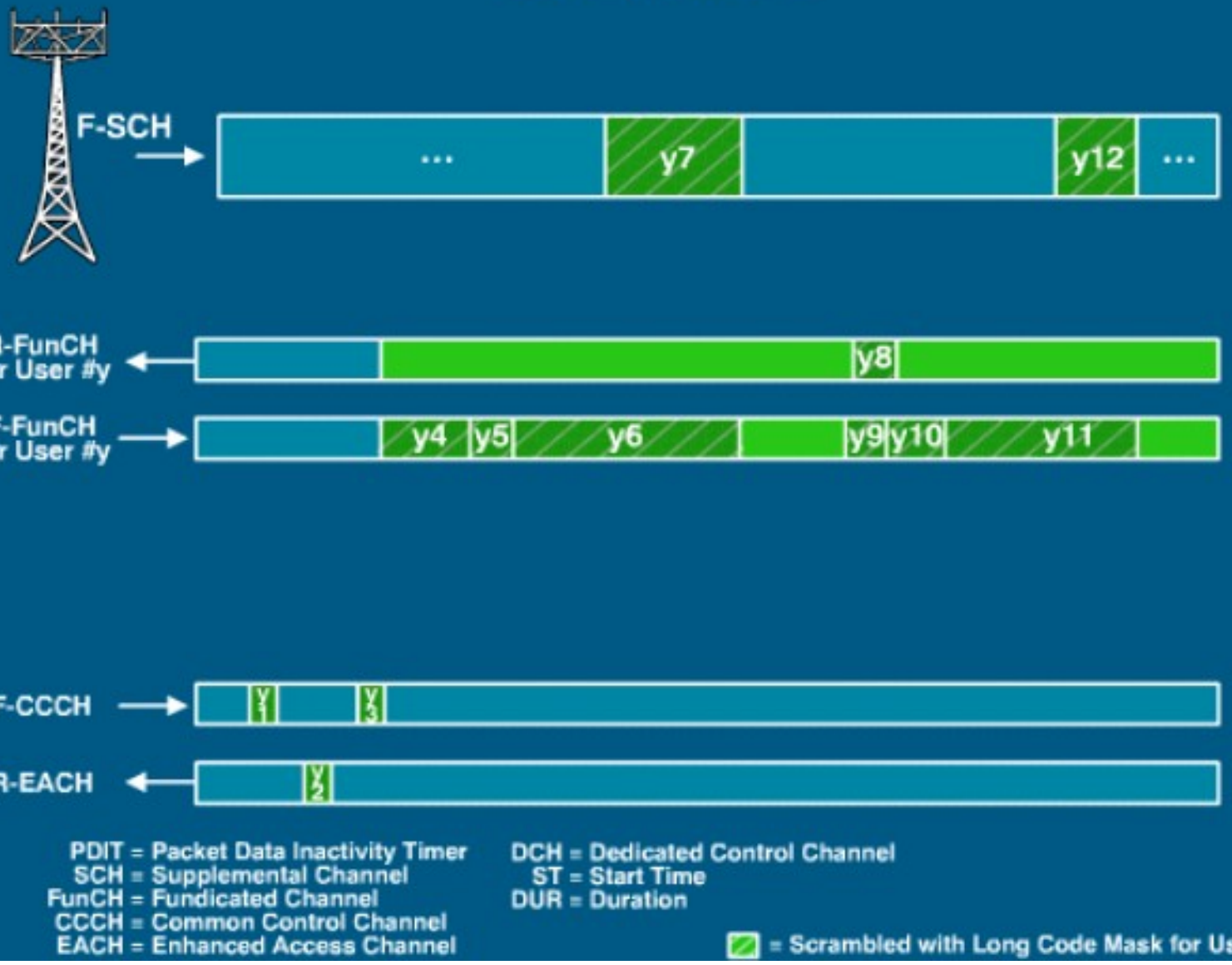
8. An Acknowledgement packet is transmitted, perhaps

9. PDIT is reset if more data is transferred before it expires

BS = Base Station
F/R = Forward/Reverse
FunCH = Fundicated Channel
FCH = Fundamental Channel
DCCH = Dedicated Control Channel

* Data transmission is not supported on the DCCH . . . only the FCH

FORWARD SCH ALLOCATION: ONE USER
ONE EXAMPLE



PDIT = Packet Data Inactivity Timer
SCH = Supplemental Channel
FunCH = Fundicated Channel
CCCH = Common Control Channel
EACH = Enhanced Access Channel

DCH = Dedicated Control Channel
ST = Start Time
DUR = Duration

= Scrambled with Long Code Mask for User #y

FORWARD SCH ALLOCATION: TWO USERS
ONE EXAMPLE



PDIT = Packet Data Inactivity Timer
SCH = Supplemental Channel
FunCH = Fundicated Channel
CCCH = Common Control Channel
EACH = Enhanced Access Channel

DCH = Dedicated Control Channel
ST = Start Time
DUR = Duration

= Hash marks indicate scrambling with Long Code Mask for User #x

= Hash marks indicate scrambling with Long Code Mask for User #y

THREE MAIN WAYS TO SHARE CDMA PACKET CAPACITY

- Individual Dedicated Data Channels re-assigned SEQUENTIALLY
  - For medium-to-large volumes of data
  - Re-assignment done with Layer 3 Control and RCC messages*
- Multiple Dedicated Data Channels assigned SIMULTANEOUSLY to multiple users
  - For medium-to-large volumes of data
  - Assignment done with Layer 3 Call Control and RRC messages*
- Common Channels
  - For small and infrequent data packets (sharing the channels with control messages)
  - Using channels such as RACH, PCH, or FACH

* These are typically sent on the RACH on the uplink and a PCH or a FACH on the downlink

END OF LESSON 2