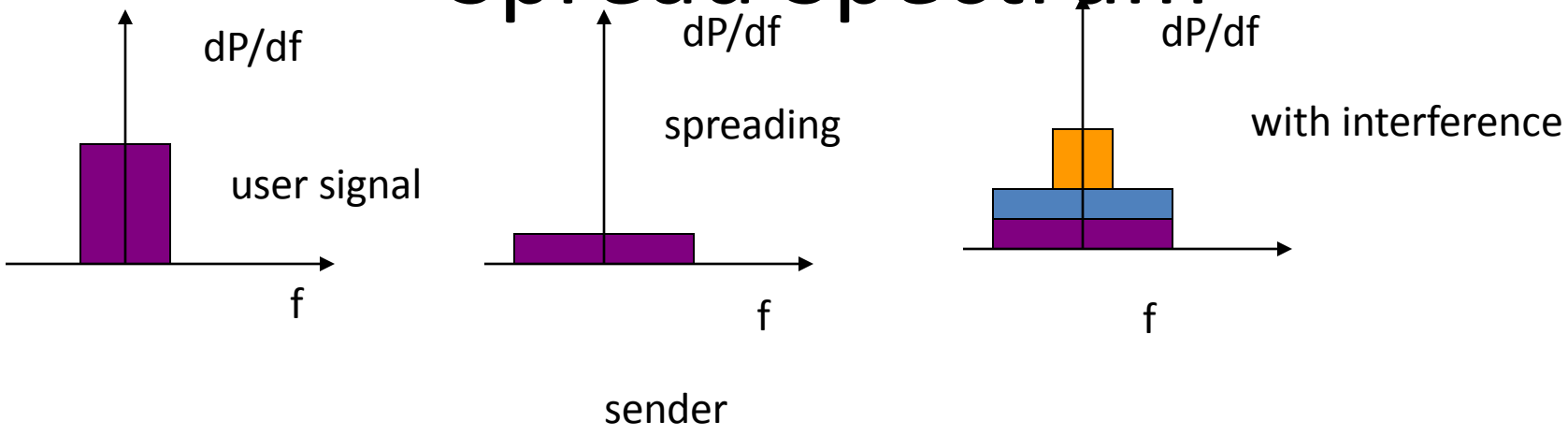
Spread Spectrum

Presented By:
Diwakar Yagyasen

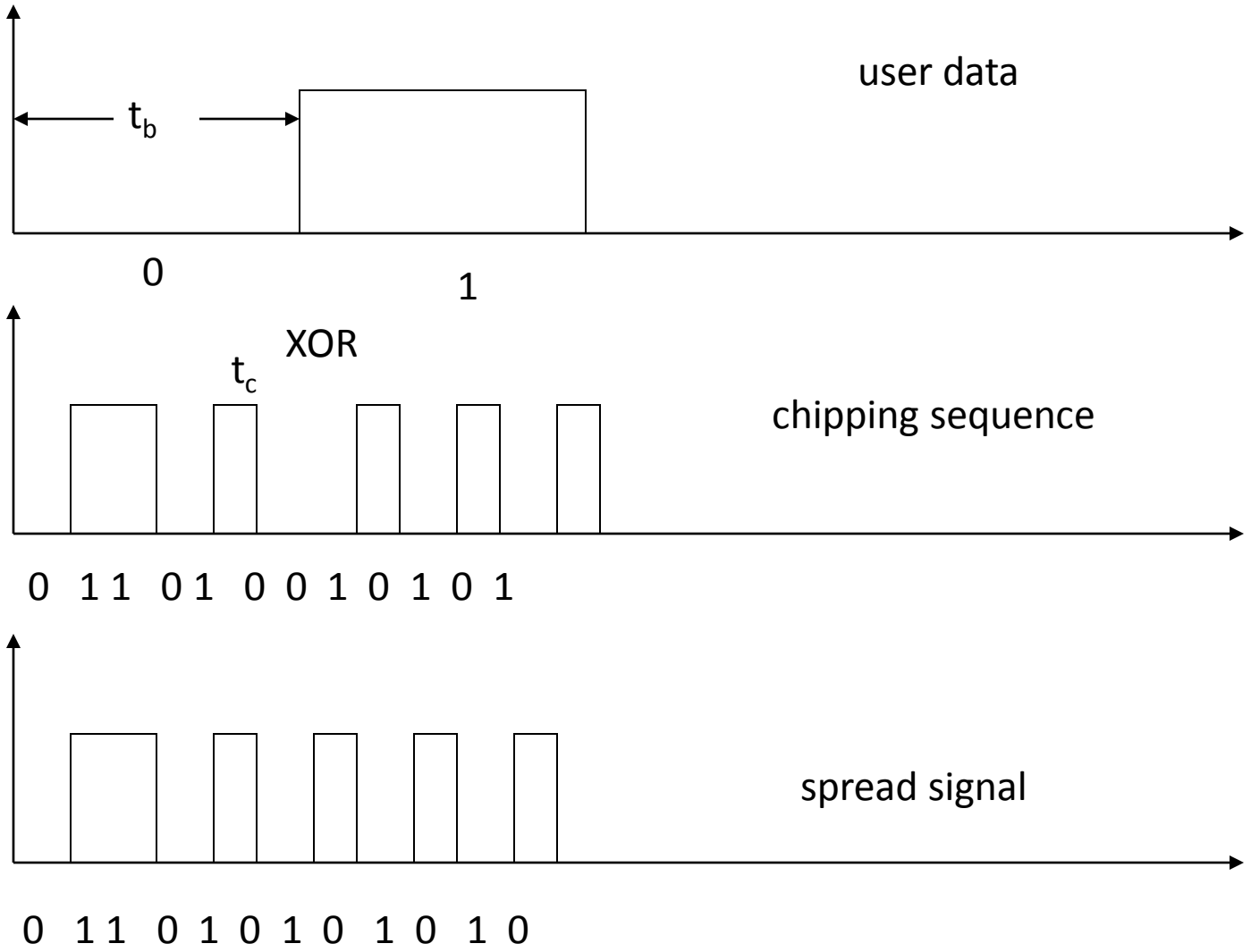
Spread Spectrum



Direct Sequence Spread Spectrum

- Takes a user bit sequence and performs an XOR with, what is known as, *chipping sequence*
- Each user bit duration t_b
- chipping sequence has smaller pulses t_c
- If chipping sequence is generated properly it may appear as random noise
  - sometimes called pseudo-noise (PN)
- t_b/t_c is known as the *spreading factor*
  - determines the bandwidth of the resultant signal
- Used by 802.11b

Direct Sequence Spread Spectrum



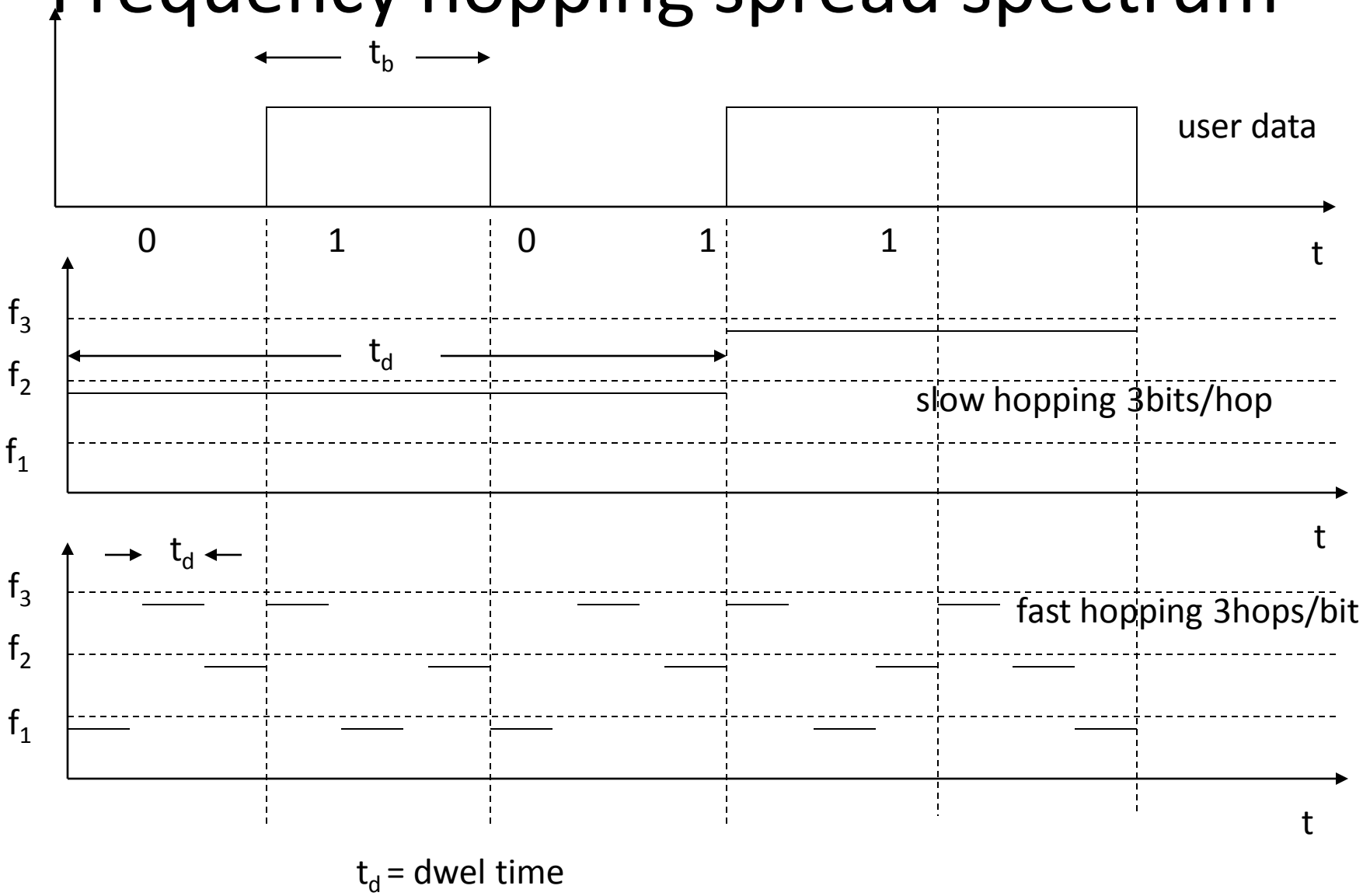
Frequency Hopping Spread Spectrum

- Total available bandwidth is split into many channels of smaller bandwidth and guard spaces
- Transmitter and receiver stay on one of these channels for a certain time and then hop to another channel
- Implements FDM and TDM
- Pattern of channel usage : *hopping sequence*
- Time spent on a particular channel: *dwell time*

Frequency Hopping Spread Spectrum

- Slow hopping
  - Transmitter uses one frequency for several bit period
  - systems are cheaper, but are prone to narrow band interference
- Fast hopping
  - Transmitter changes frequency several times in one bit period
  - Transmitter and receivers have to stay synchronized within smaller tolerances
  - Better immuned to narrow band interference as they stick to one frequency for a very short period
- Receiver must know the hopping sequence and stay synchronized with the transmitter
- Used by bluetooth

Frequency hopping spread spectrum



t_d = dwel time