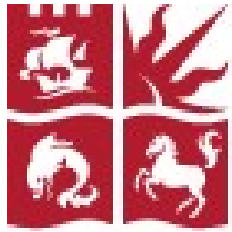
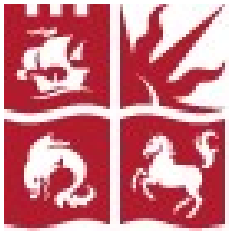


EENGM4221:
Broadband Wireless Communications

Lecture 5: Solutions Overview

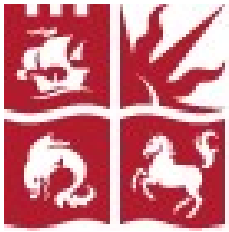
Dr Simon Armour

Review of Challenges



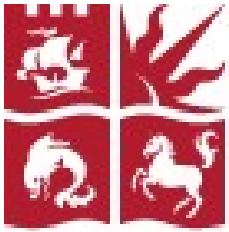
- As we have seen, facilitating Broadband Wireless Communications imposes some significant challenges:
  - Spectral Efficiency, Energy efficiency, cost etc
  - QoS demands
  - Significant Channel Impairments
    - Slow/Fast Fading
    - Interference
  - Wireless Medium Access challenges

Other units provide us with some solutions (1)



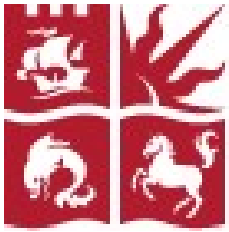
- Not surprisingly, we require many tools in our Engineering ‘toolbox’ to tackle these challenges
- Many of these tools are covered elsewhere in your studies:
  - Large scale loss and fading effects can be mitigated by cellular deployments (Mobile Comms Systems unit)
  - Fading can be mitigated by Diversity (Mobile Comms Systems unit)
    - Time, Frequency, Space/Polarisation

Other units provide us with some solutions (2)



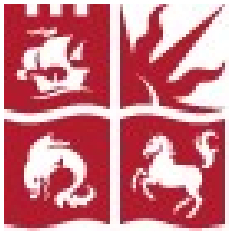
- Dispersion can be mitigated by:
  - Equalisation (Advanced Mobile Radio Techniques unit)
  - Multicarrier (Advanced Mobile Radio Techniques unit)
  - Spread Spectrum/CDMA (Advanced Mobile Radio Techniques unit)
- MIMO can exploit spatial diversity for SNR gain or spatial multiplexing (AMRT)
- Errors in General can be mitigated by Error Control Coding (Coding Theory Unit)

What's New in Broadband Wireless Communications



- We will not duplicate these here. However, we will introduce some others:
  - Link Adaptation
    - mitigates free space and shadowing loss
  - Dynamic Resource Allocation
    - Another source of diversity: 'Multi-user Diversity'
  - HARQ
    - mitigates errors and exploits diversity
- These 'tools' add to the rest of the 'tool box'; they don't replace the others

Review of Lecture 5



- These three techniques are additions to what we have covered in other units:
  - Link Adaptation
  - Dynamic Resource Allocation
  - HARQ

Ref: