Wireless Systems Security

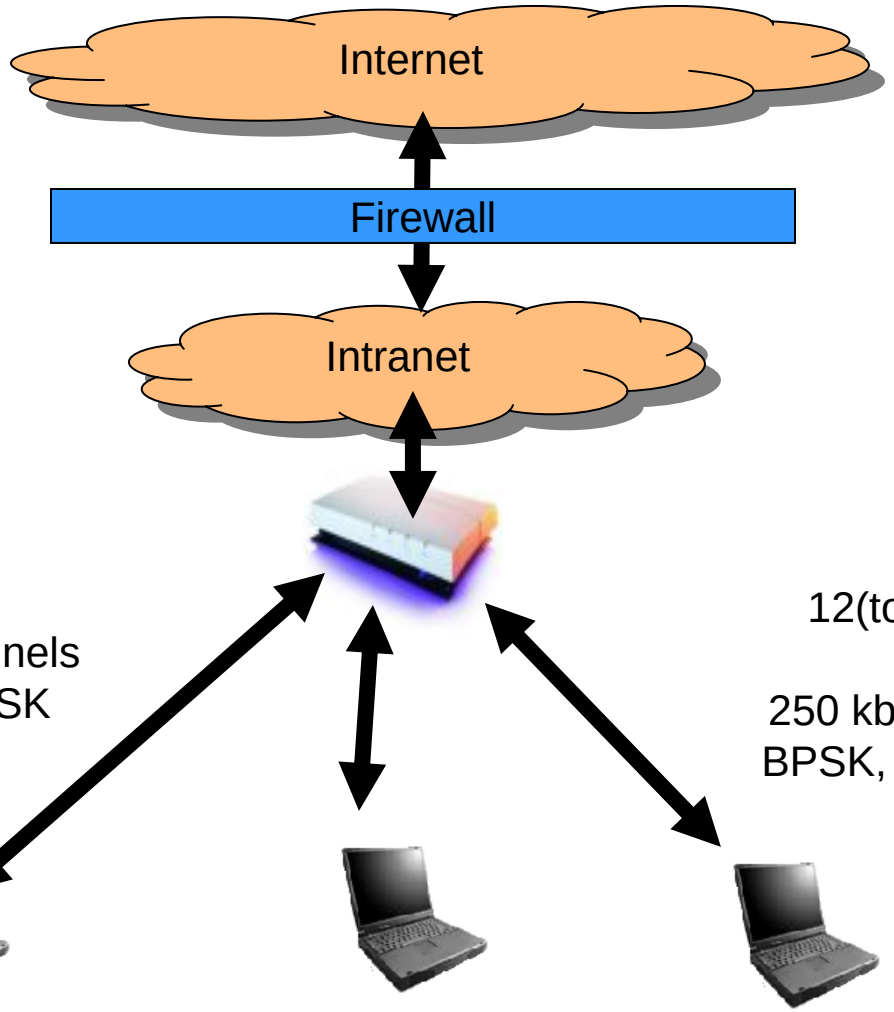
EE/NiS/TM-584-A/WS

Bruce McNair
bmcnair@stevens.edu

Week 10

Case Study 6

Case 6 – Wireless LANs
802.11a, b, g



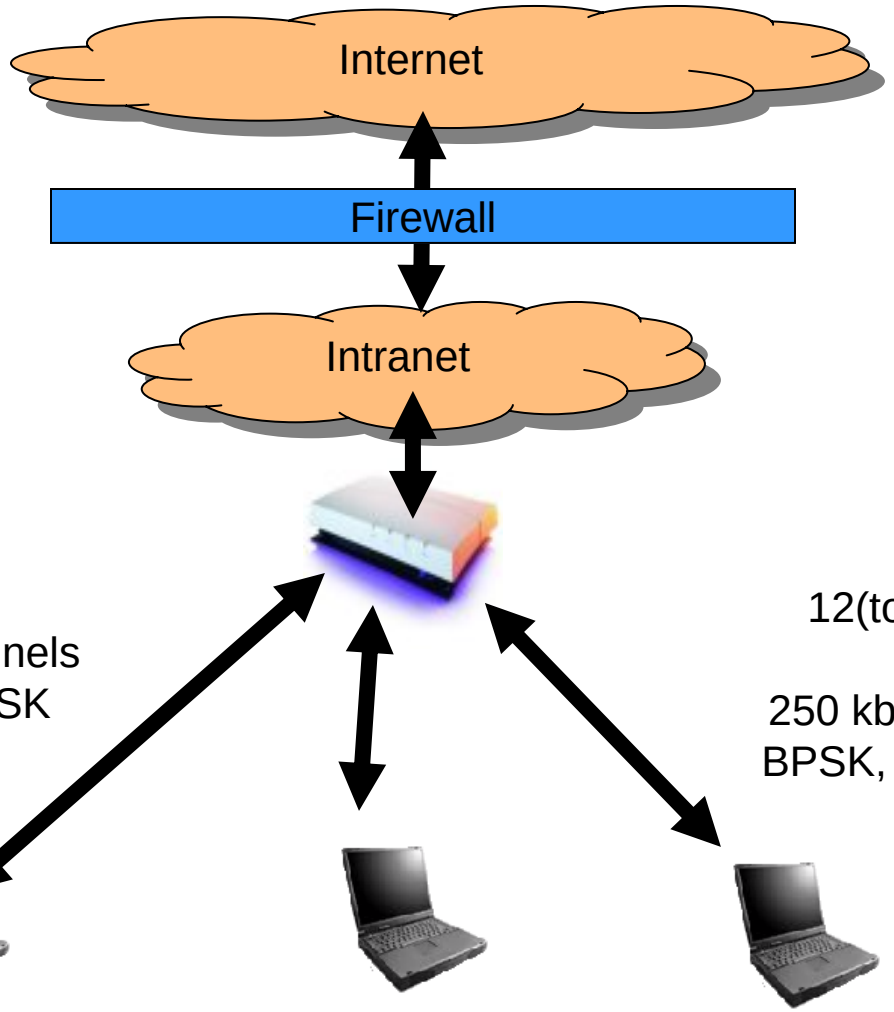
802.11b

2.400-2.4835 GHz
11 TDD overlapping channels
11 Mc/s DS-SS, CCK/PSK

802.11a

5.15-5.35 GHz,
5.725-5.825 GHz
12(to 20) non-overlapping
TDD channels
250 kbaud OFDM (52 carriers)
BPSK, QPSK, 16QAM, 64QAM
on each carrier

Case 6 – Wireless LANs
802.11a, b, g



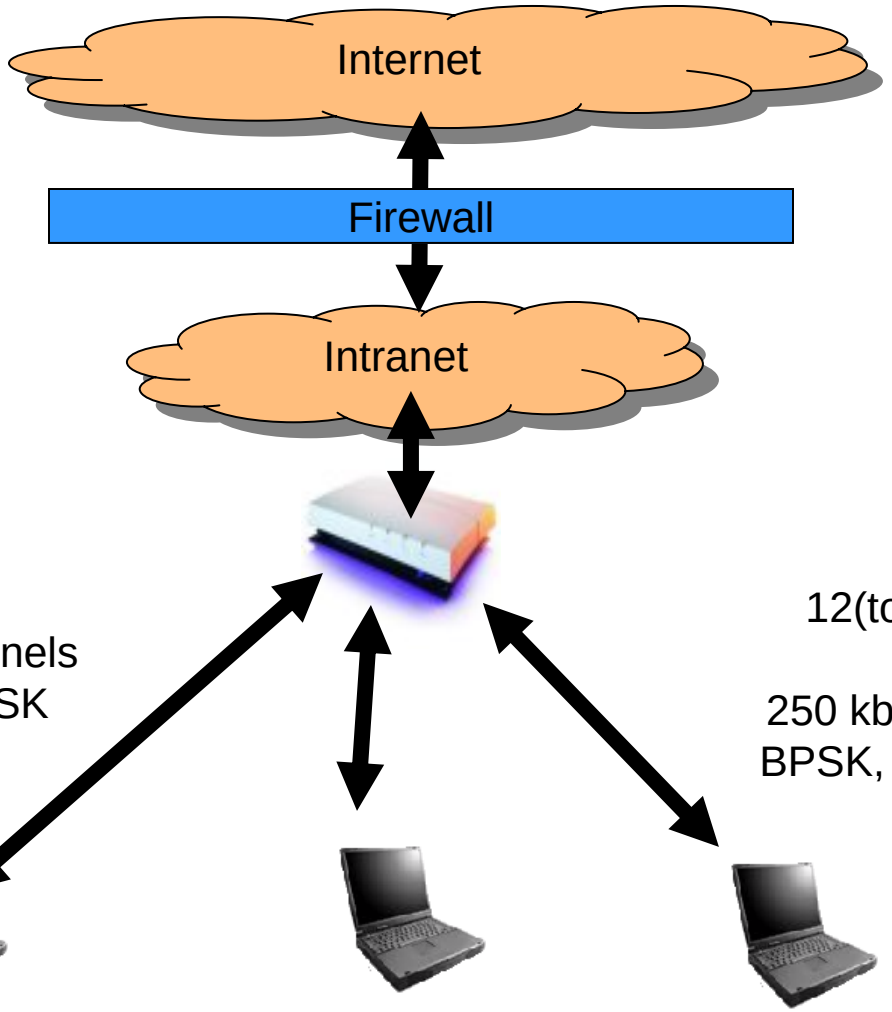
802.11b

2.400-2.4835 GHz
11 TDD overlapping channels
11 Mc/s DS-SS, CCK/PSK

802.11a

5.15-5.35 GHz,
5.725-5.825 GHz
12(to 20) non-overlapping
TDD channels
250 kbaud OFDM (52 carriers)
BPSK, QPSK, 16QAM, 64QAM
on each carrier

Case 6 – Wireless LANs
802.11a, b, g



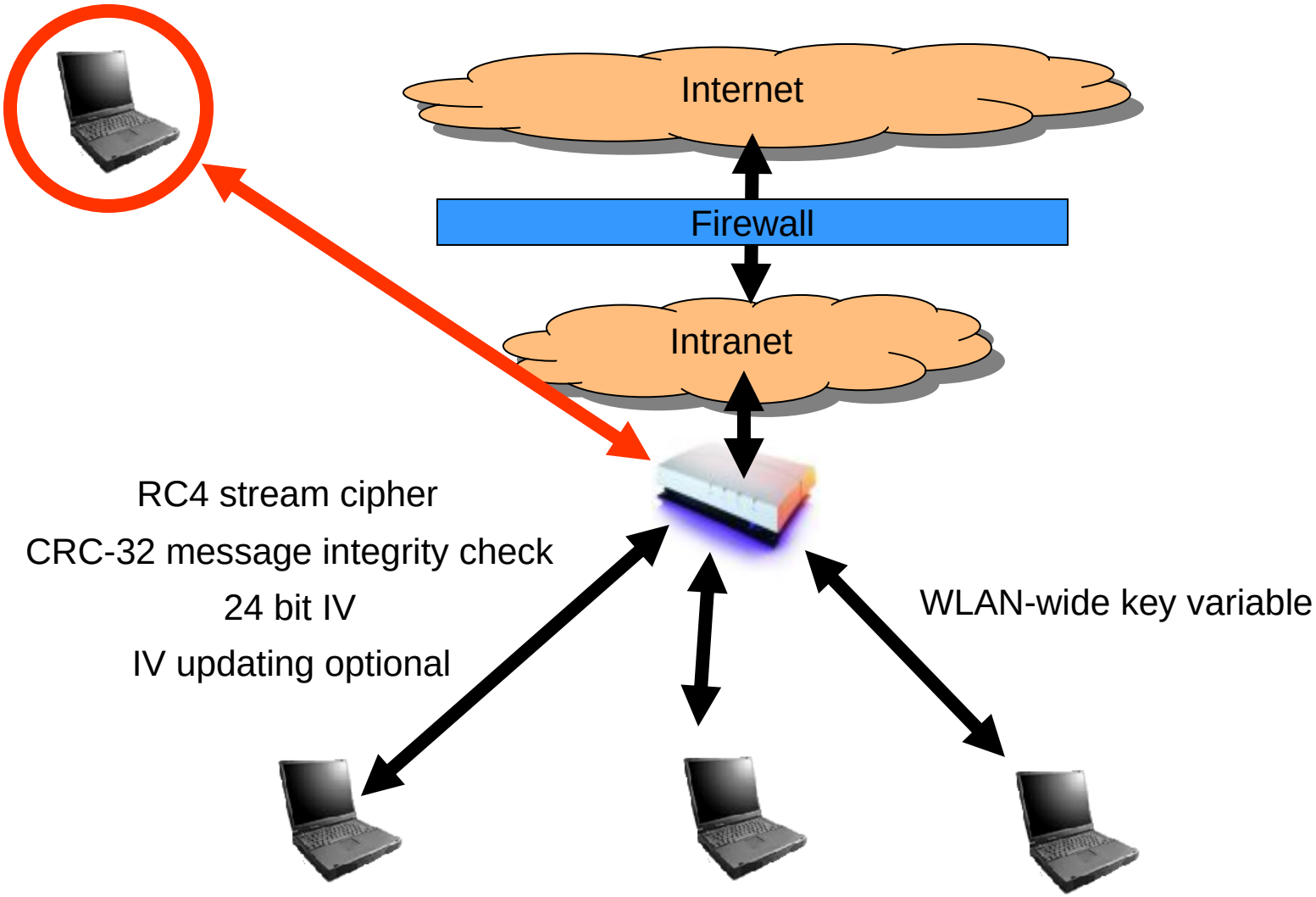
802.11b

2.400-2.4835 GHz
11 TDD overlapping channels
11 Mc/s DS-SS, CCK/PSK

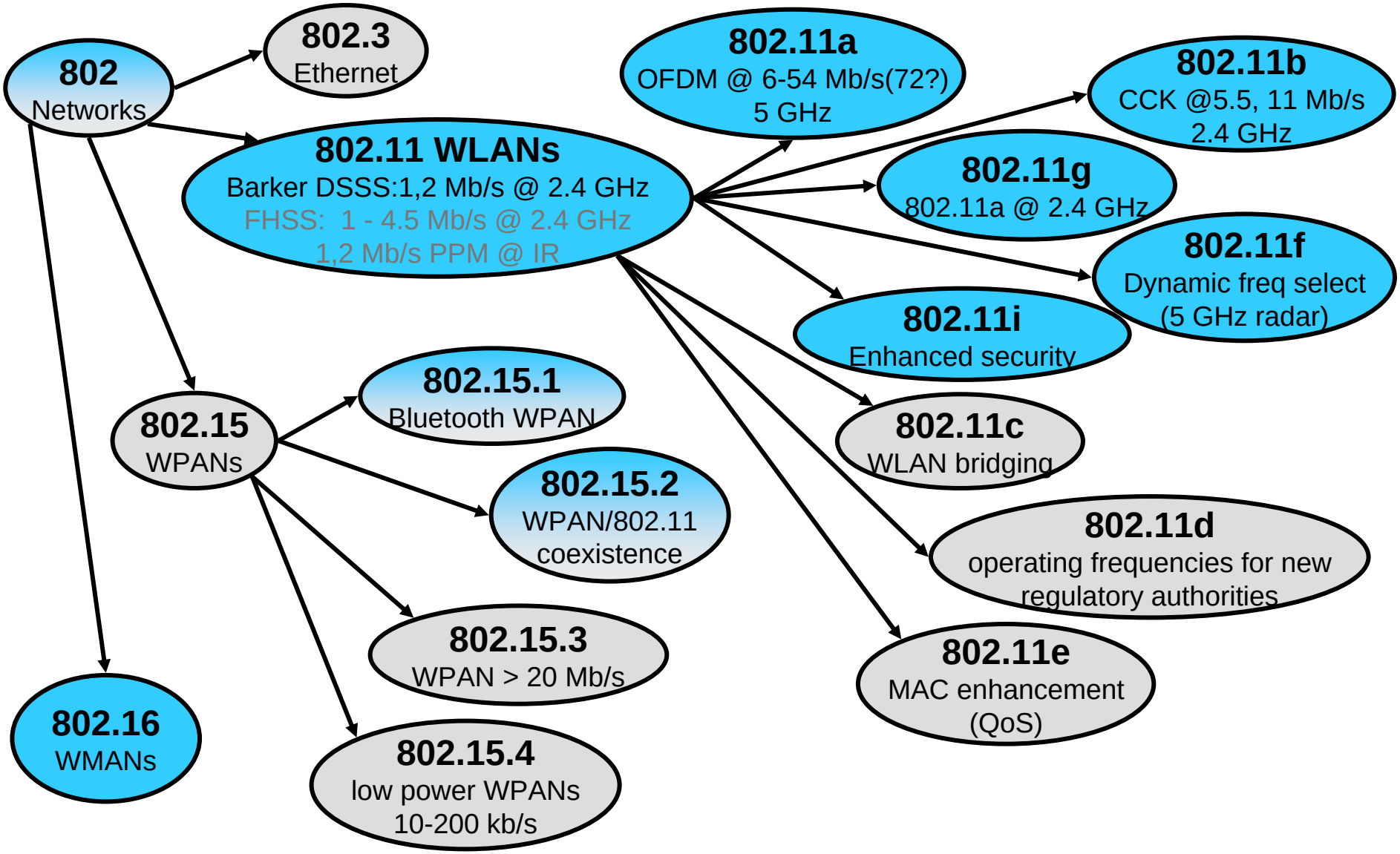
802.11a

5.15-5.35 GHz,
5.725-5.825 GHz
12(to 20) non-overlapping
TDD channels
250 kbaud OFDM (52 carriers)
BPSK, QPSK, 16QAM, 64QAM
on each carrier

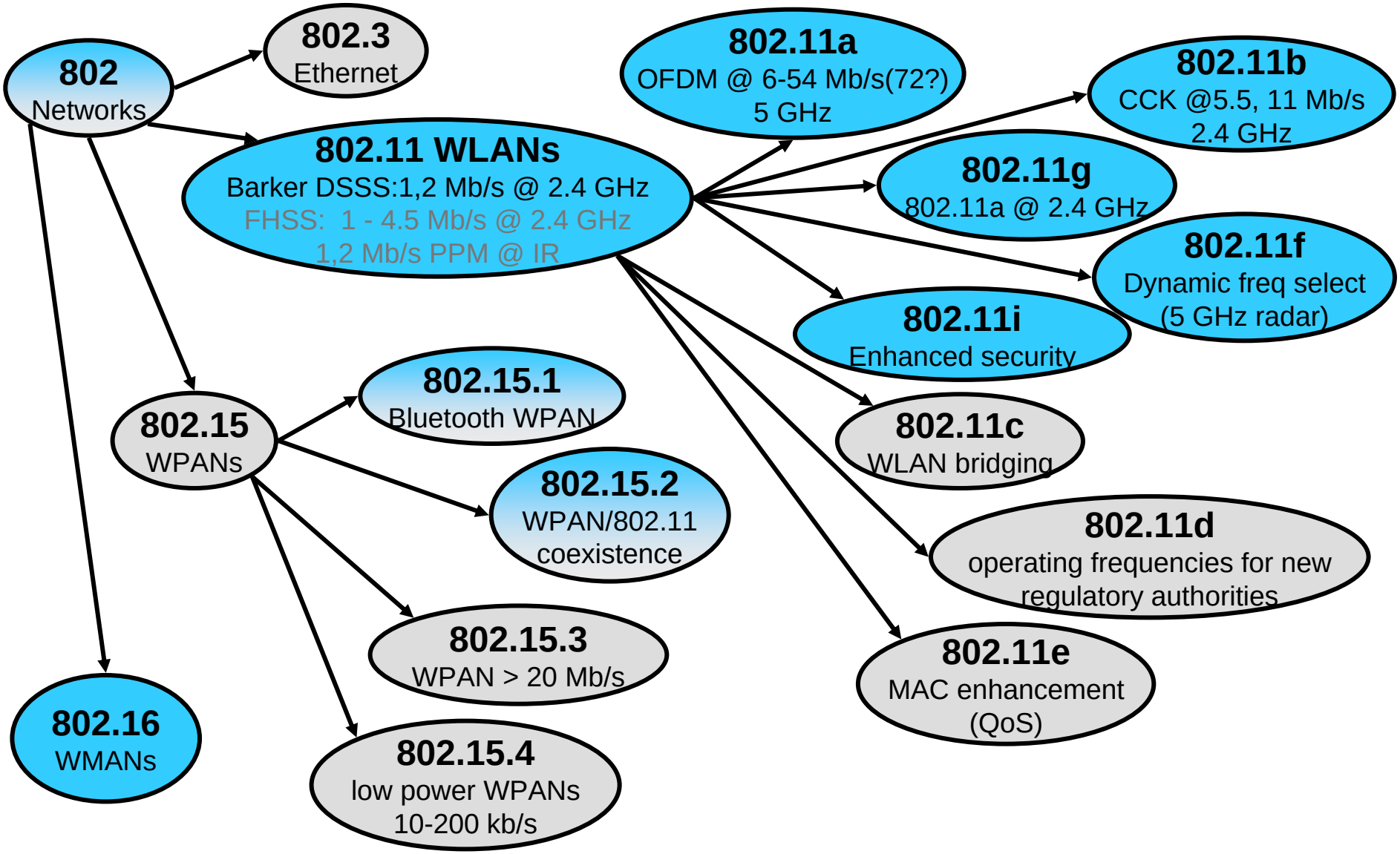
Case 6 – Wireless LANs
802.11a, b, g



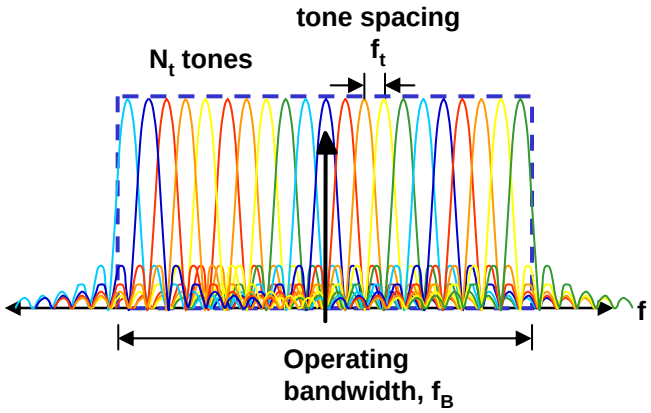
IEEE 802 Standards (Alphabet Soup)

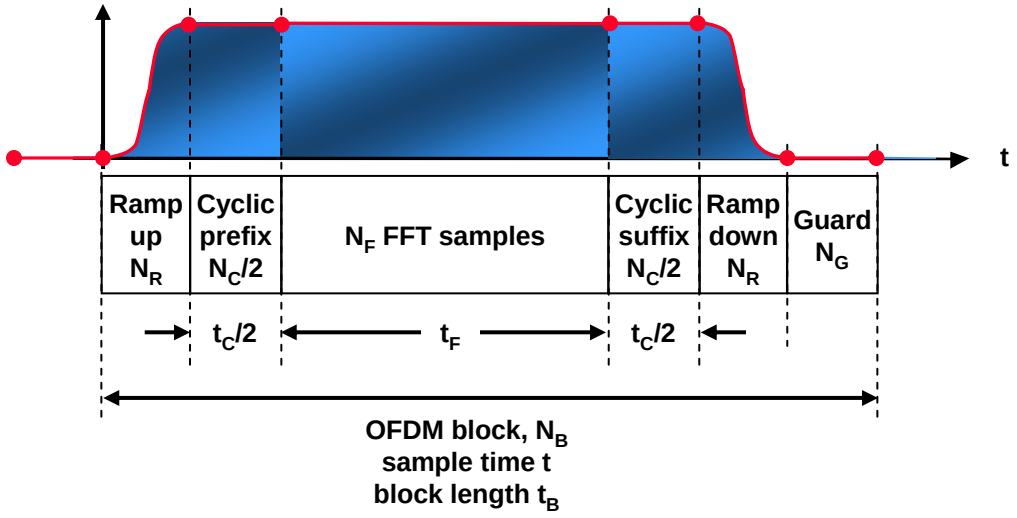


IEEE 802 Standards (Alphabet Soup)



OFDM Basics





Total bandwidth $f_B = N_t f_t$

Tone spacing vs active block time $f_t = \frac{1}{t_F}$

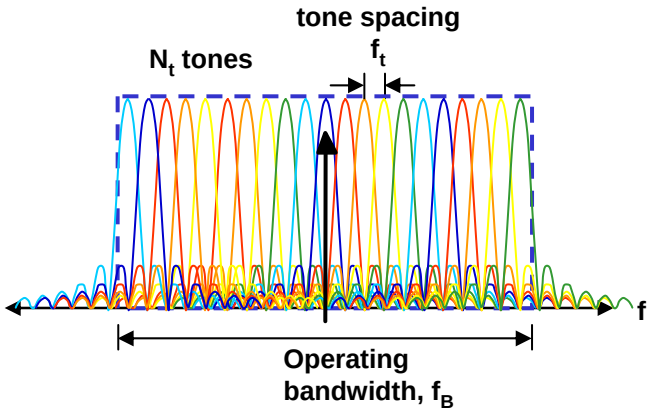
$$N_B = 2N_R + N_C + N_G + N_F$$

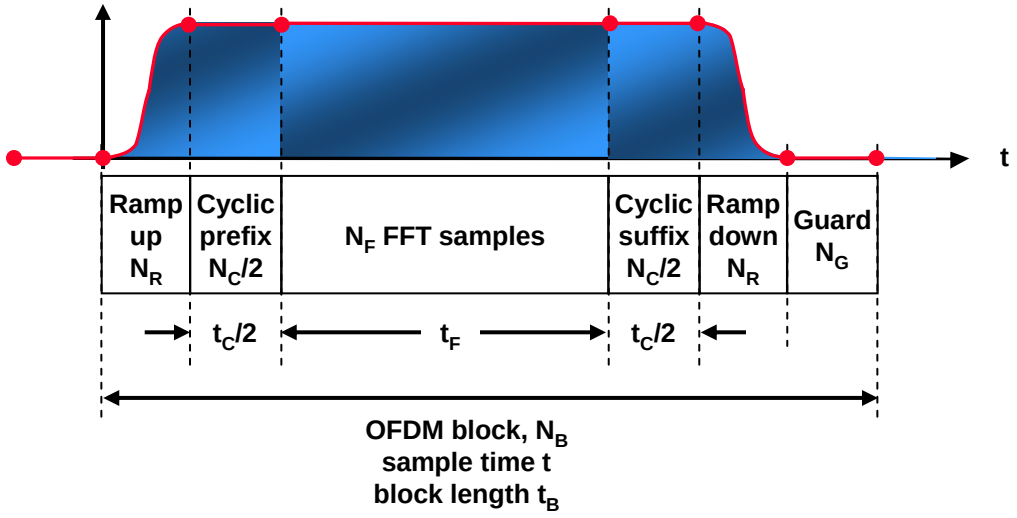
Block efficiency $\eta = \frac{N_F}{N_B} = \frac{N_F}{N_F + N_C + 2N_R + N_G}$

Tolerance to delay spread $\approx t_C \propto N_C$

Raw capacity for M-ary tone modulation $N_t M$

OFDM Basics





Total bandwidth $f_B = N_t f_t$

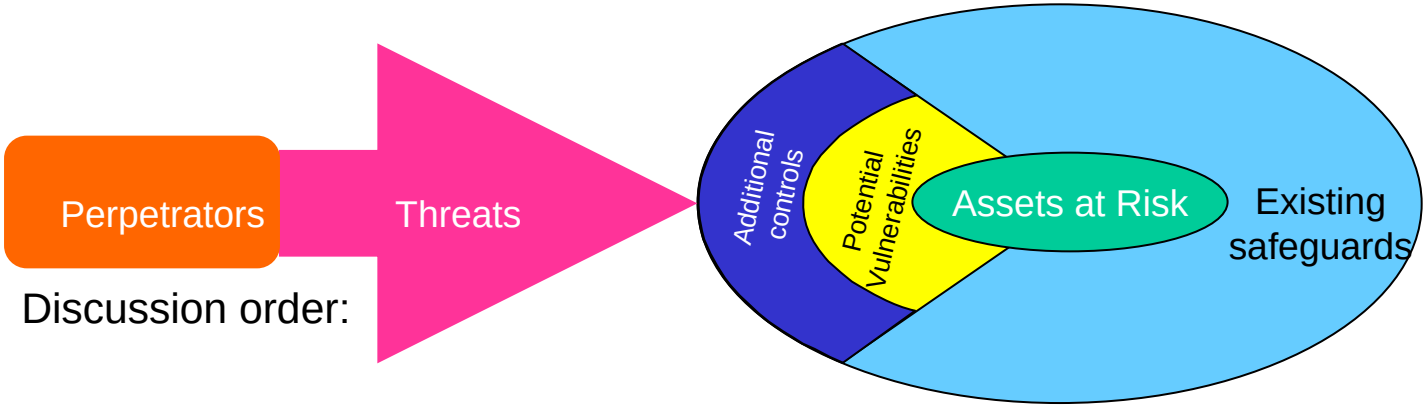
Tone spacing vs active block time $f_t = \frac{1}{t_F}$

$$N_B = 2N_R + N_C + N_G + N_F$$

Block efficiency $\eta = \frac{N_F}{N_B} = \frac{N_F}{N_F + N_C + 2N_R + N_G}$

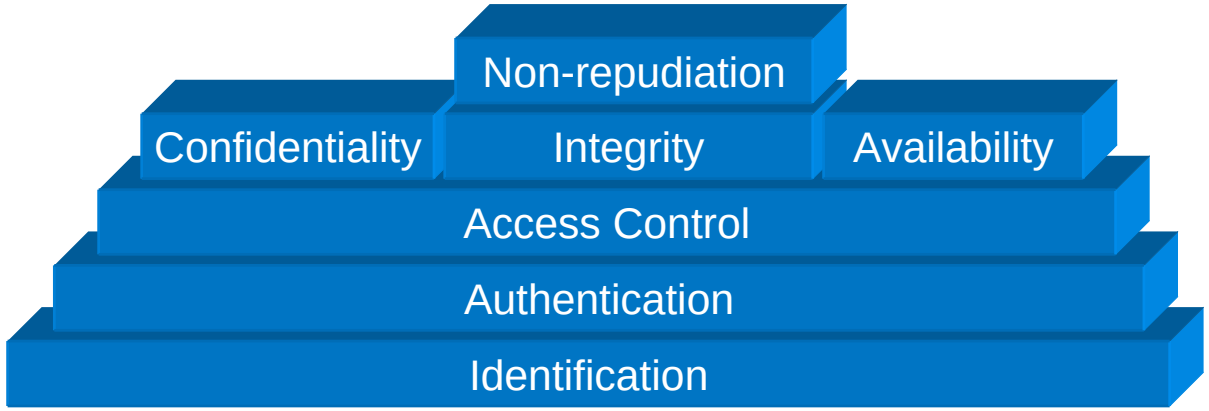
Tolerance to delay spread $\approx t_C \propto N_C$

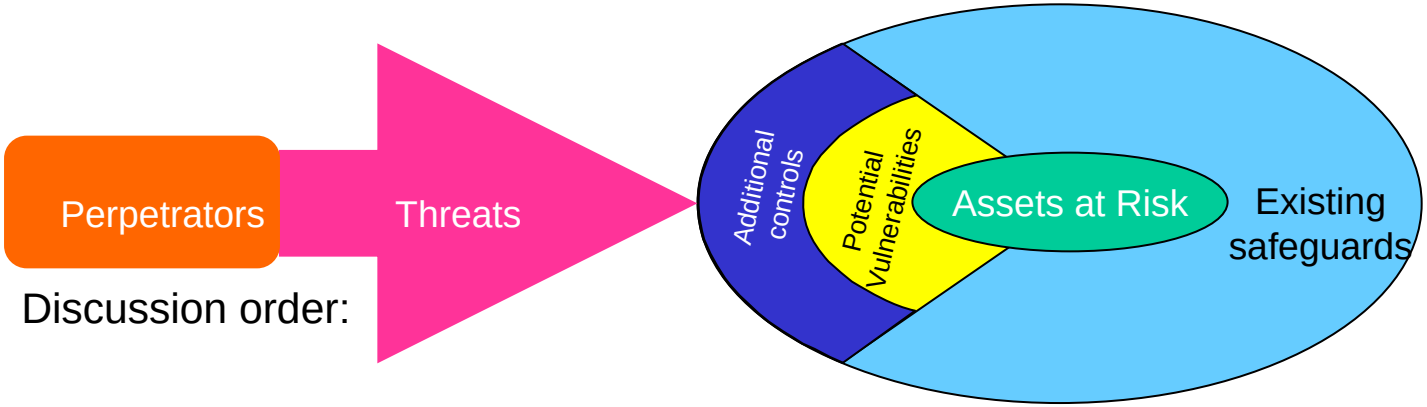
Raw capacity for M-ary tone modulation $N_t M$



Discussion order:

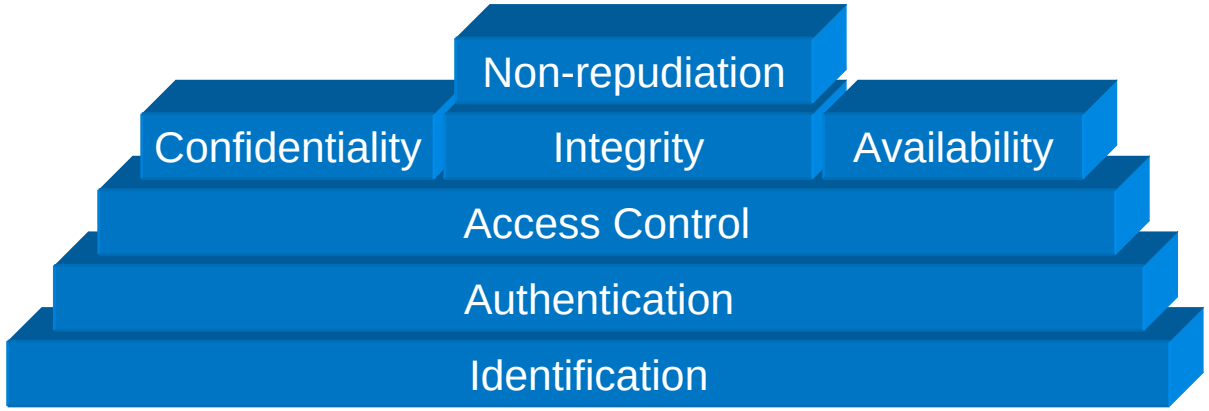
- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls

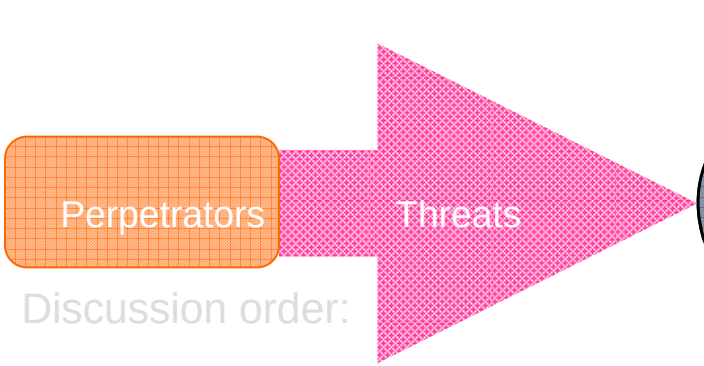


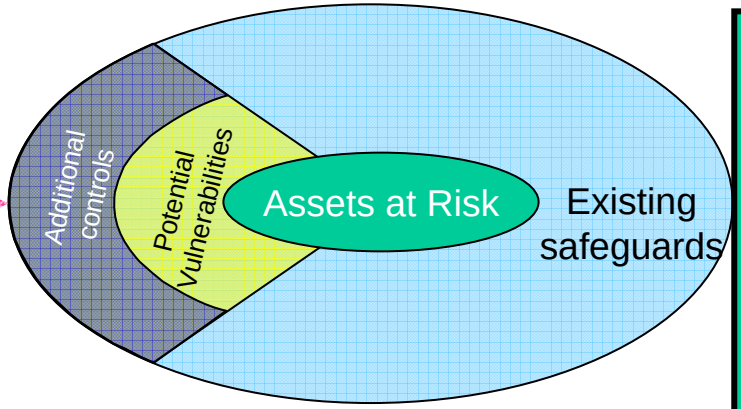


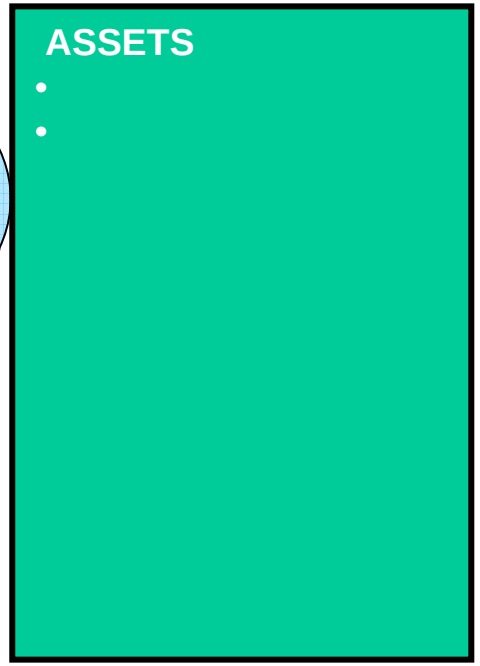
Discussion order:

- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls



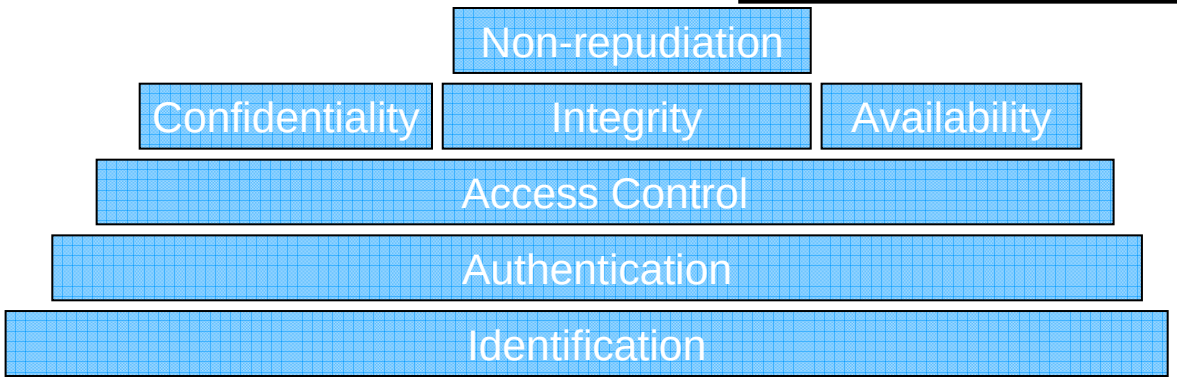


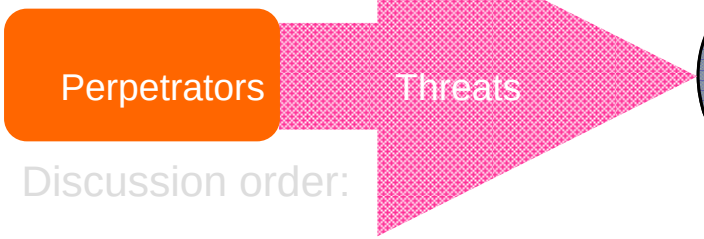


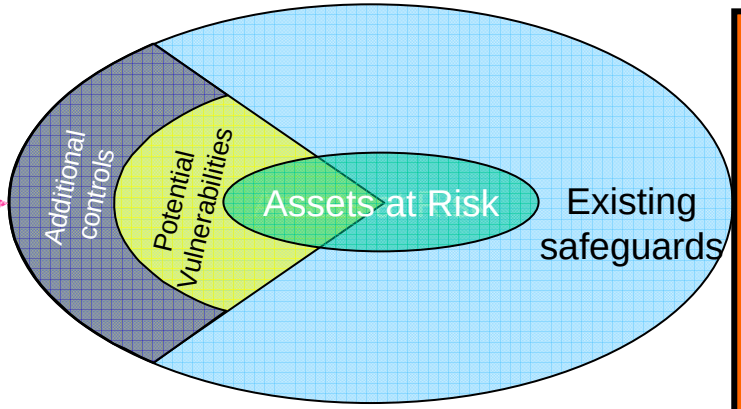


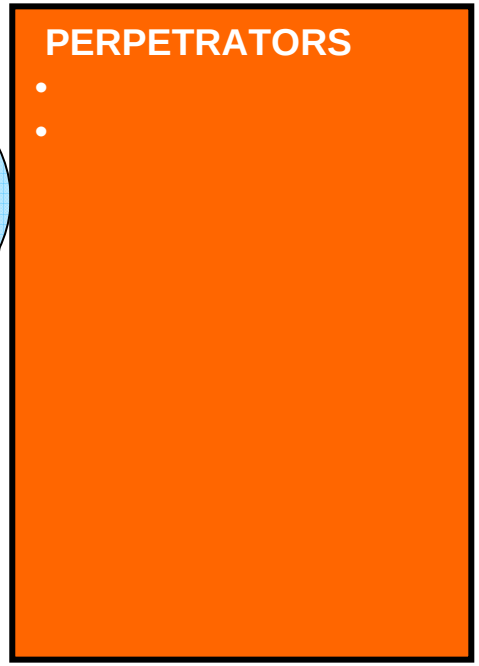
Discussion order:

- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls



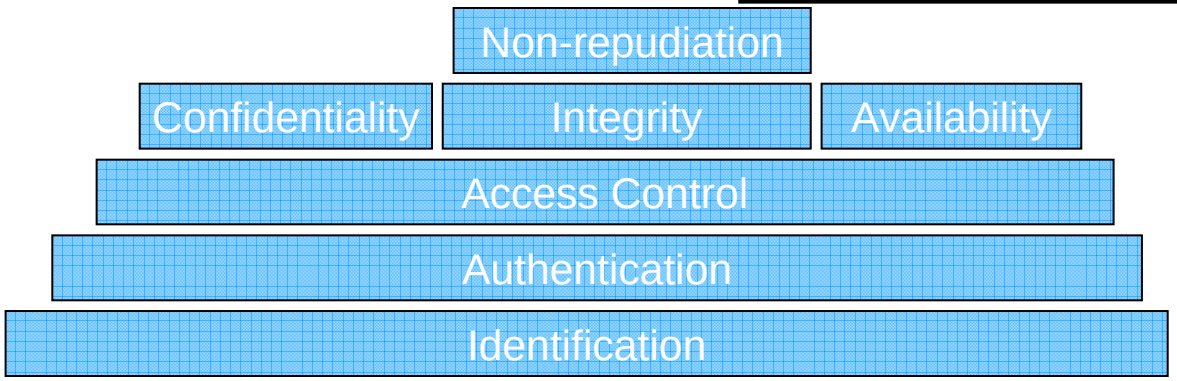


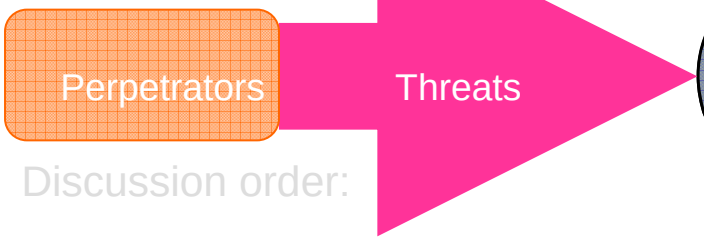


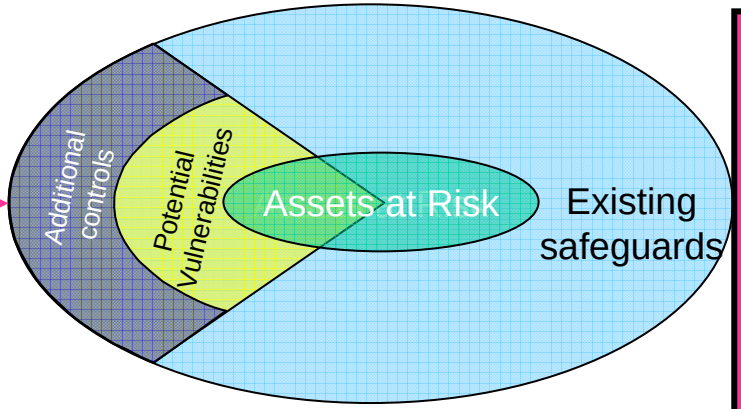


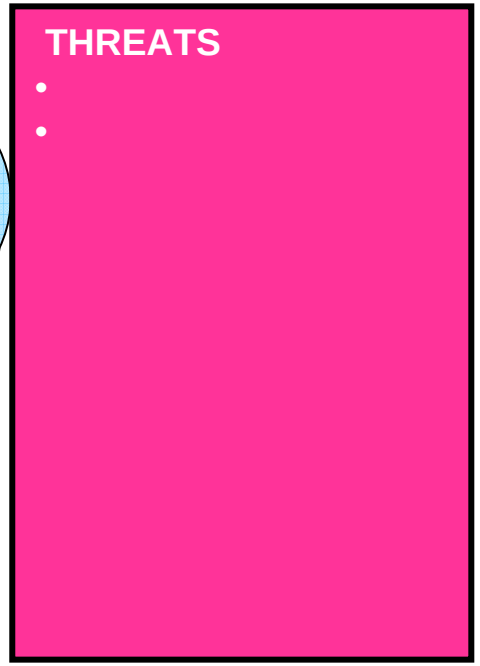
Discussion order:

- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls



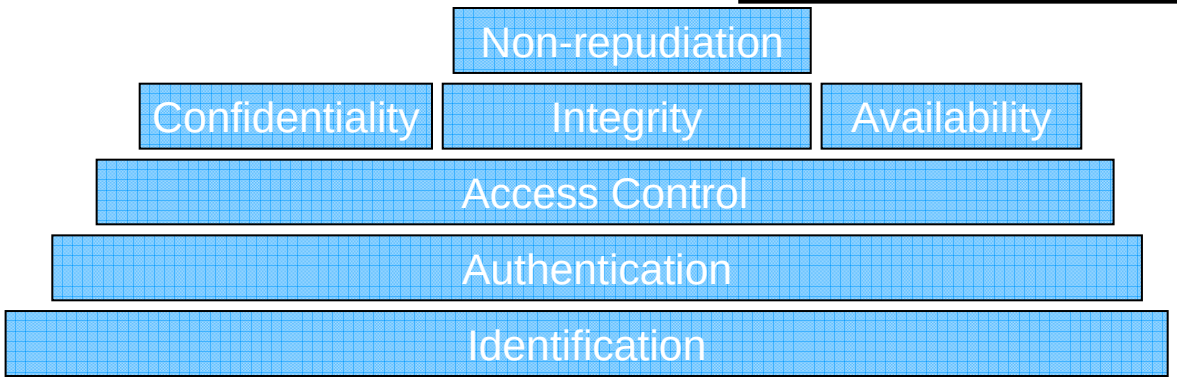


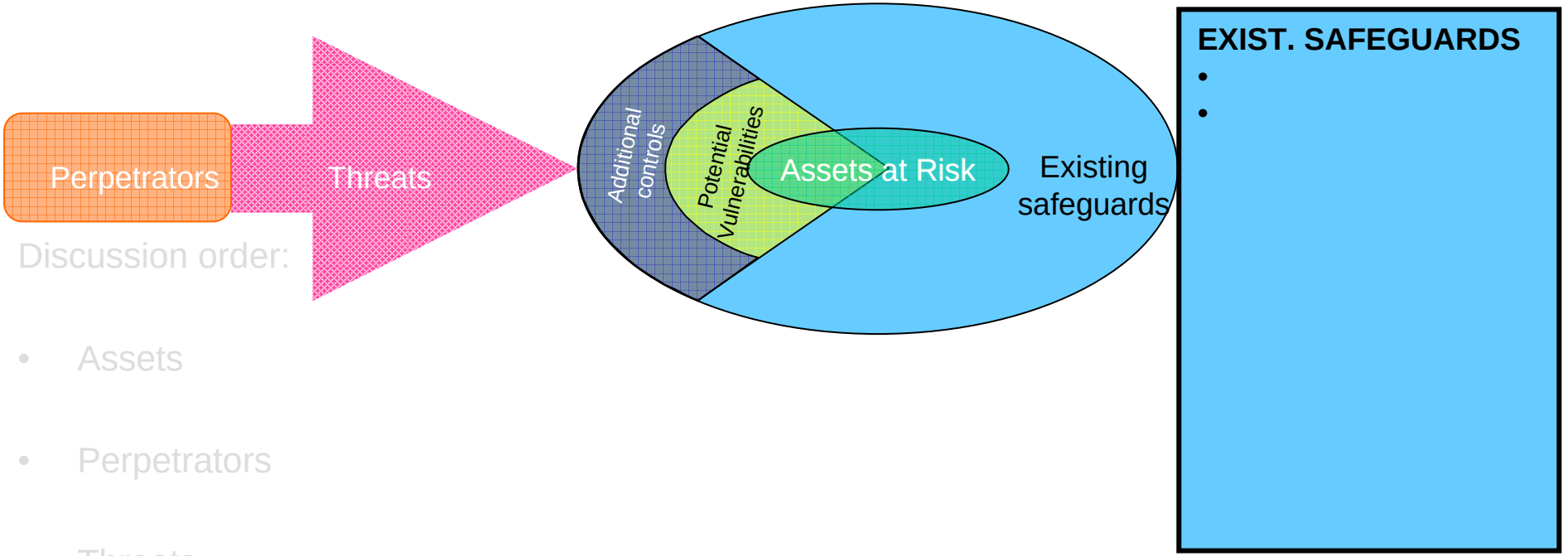




Discussion order:

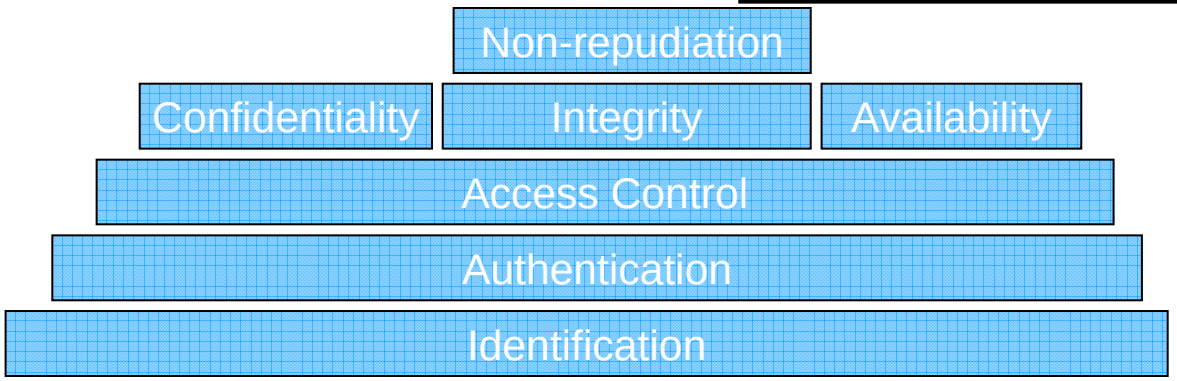
- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls

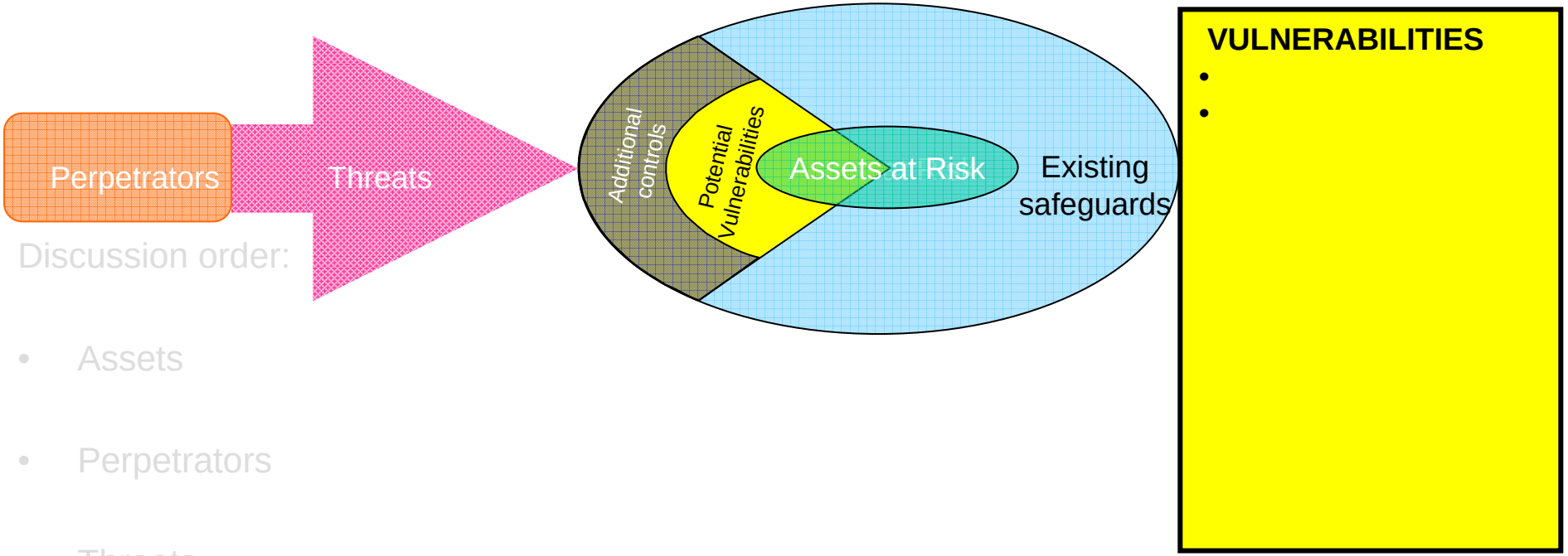




Discussion order:

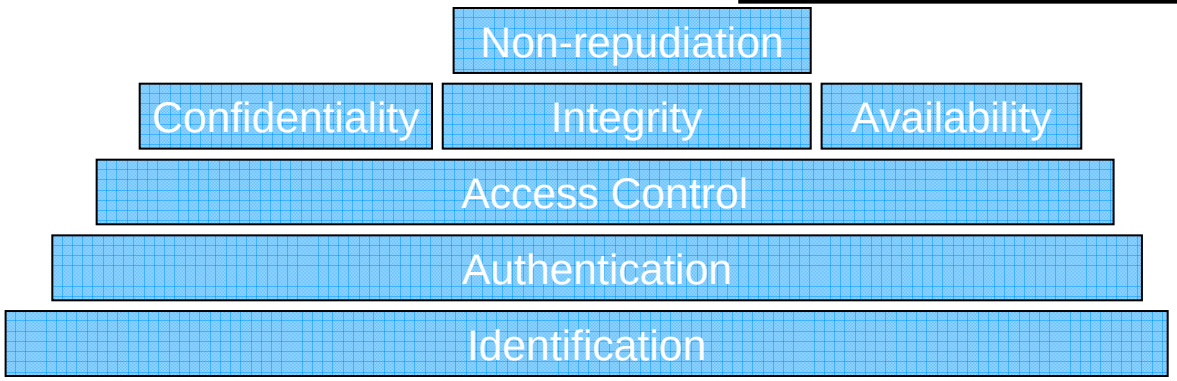
- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls

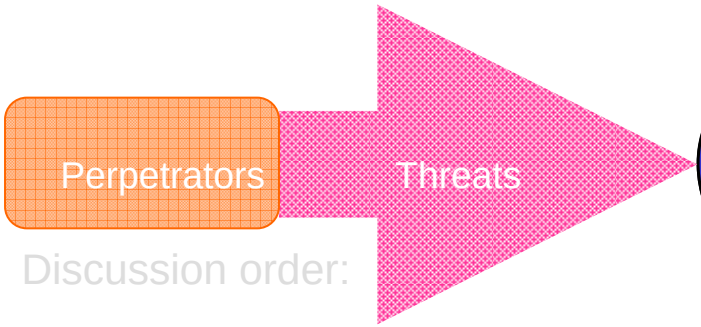


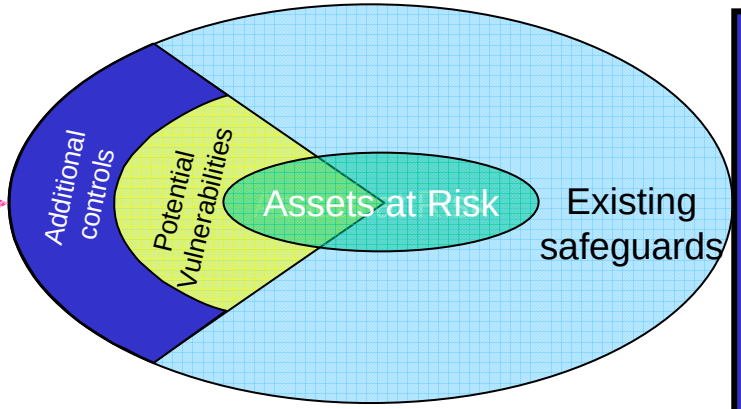


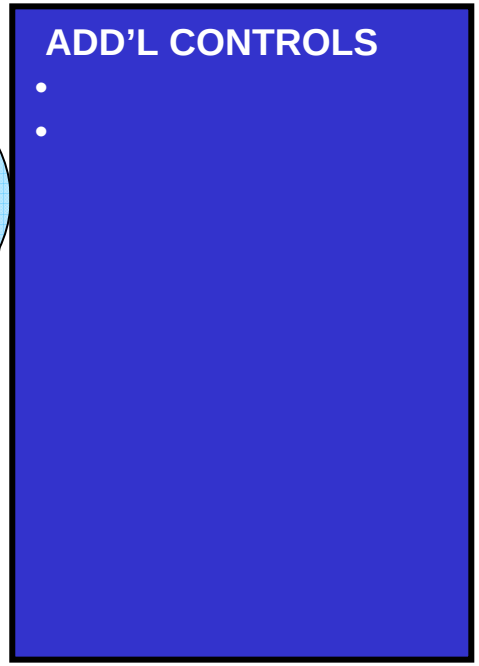
Discussion order:

- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls



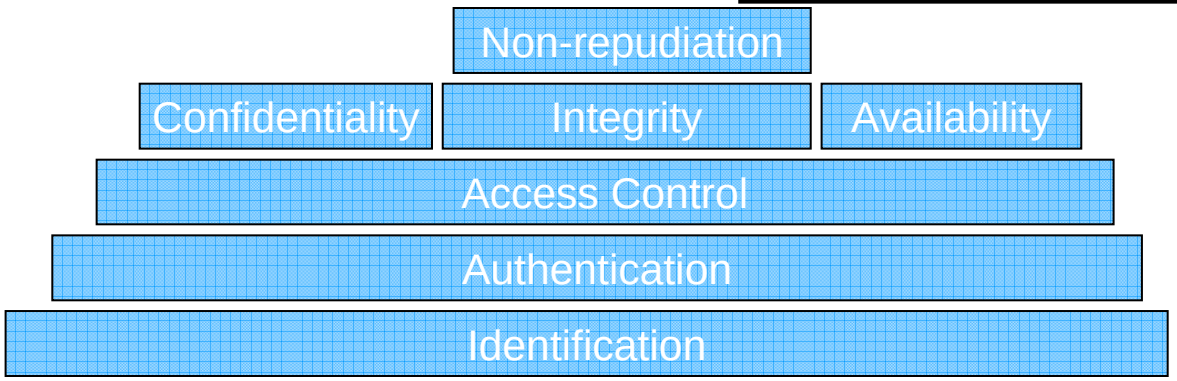






Discussion order:

- Assets
- Perpetrators
- Threats
- Existing Safeguards
- Potential Vulnerabilities
- Additional Security Controls



Case 7 –
Wireless Metropolitan Area Networks (W-MANs)
802.16

802.16a: 2-11 GHz 256/2048 carrier OFDM,
802.16.1: 10 – 66 GHz LOS
120 Mb/s capacity
T1+ user data, multiple voice channels, Wireless Local Loop
Triple DES encryption of traffic
Single DES encryption of key exchange
Authentication of terminal with X.509 PKI certificates