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AUSTRALIA

TELECOMMUNICATIONS
16TH NOVEMBER 2015
NEWCASTLE DIVISION OFFICE

Teacher Development Program
Bringing schools and Engineering together

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- **Introduction**
- **Examples**
  - **Encryption**
  - **Big comms ≡ big data**
  - **Metadata analysis**
- **Case studies**
  - **Analogue telephones**
  - **Case study – passive optical networking**

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Introduction

Chris Bird

Bachelor of Computer Engineering, Honours I, Chartered Engineer

University of Newcastle Industry Scholarship Scheme – Computer Systems Australia

10 years in R&D in industrial electronics, industry exposure – predominantly in mining

Opportunities to travel:

- Central QLD
- Brazil
- South Africa
- Utah and Pennsylvania

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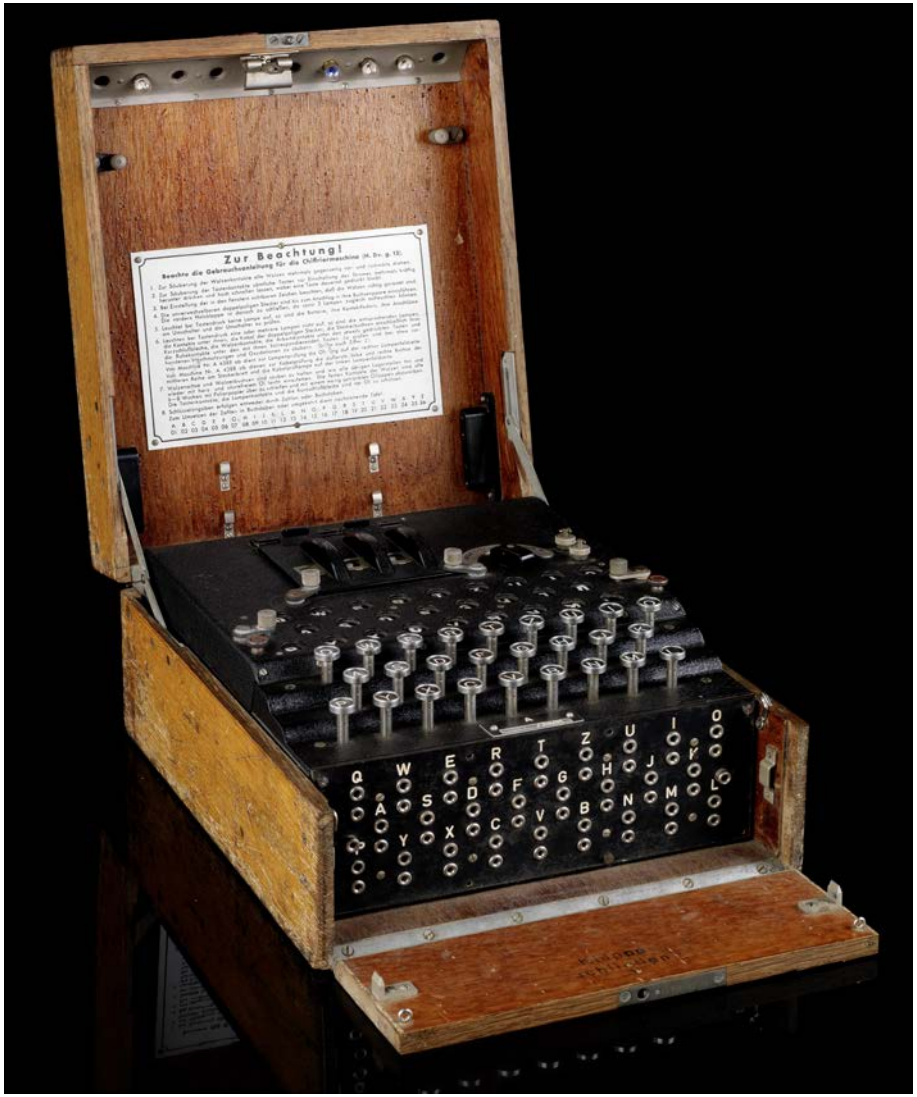
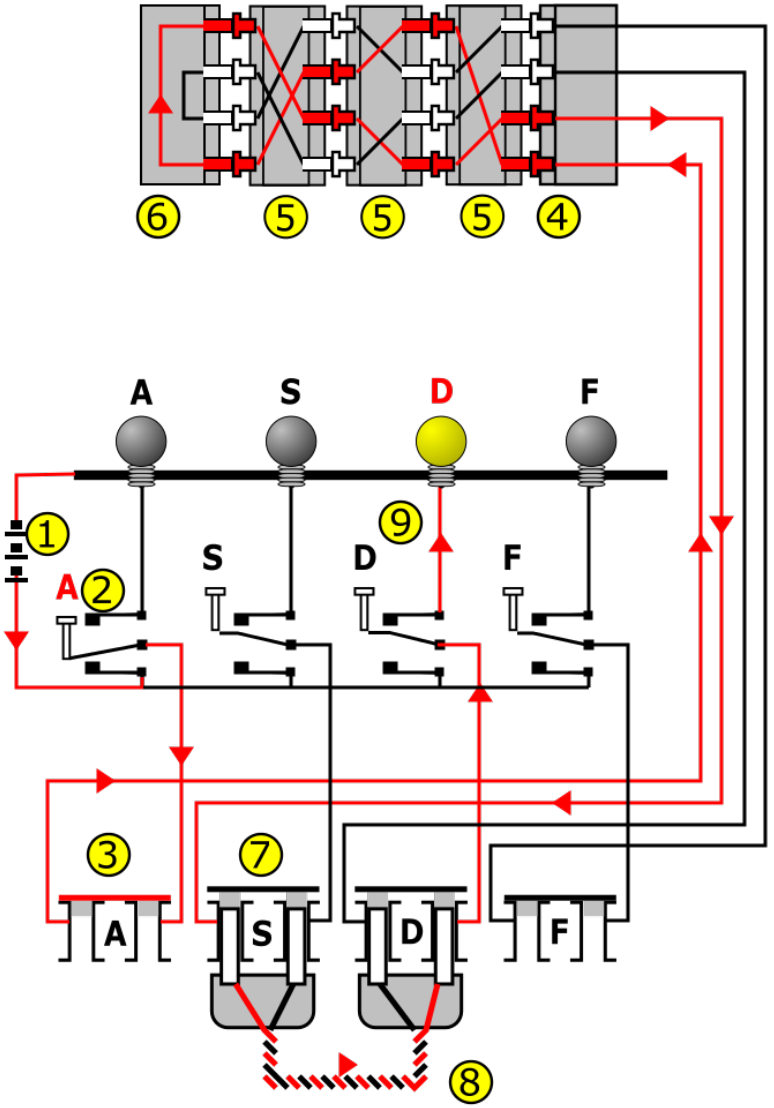
SOME EXAMPLES…

AND THEIR IMPLICATIONS

AKA THE MISCELLANY


Zur Beachtung!
Q W E R T Z U I O
A S D F G H J K
Y X C V B N M L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Encryption – the Enigma Machine

- Initially decrypted by Polish Cypher Bureau 1932
- Famously ‘cracked’ at Bletchley Park (Turing Et Al)
- Strategically significant throughout the war
  - Battle of the Atlantic
  - D-Day preparations

…but how many lives is the secret worth?


+5
0/1
0/2
Moves:
33
Score:
4520

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Big comms ≡ *big data* – Candy Crush Saga

- Fundamentally enabled by telecommunications technology – live data sharing for 'risk tuning'
- Played 151,000,000,000 times last year
- >143,000,000 active users
- Takes in $997,428 per **day**
  (cf Angry Birds @ $11k/day)

…how to train the next generation of compulsive gamblers

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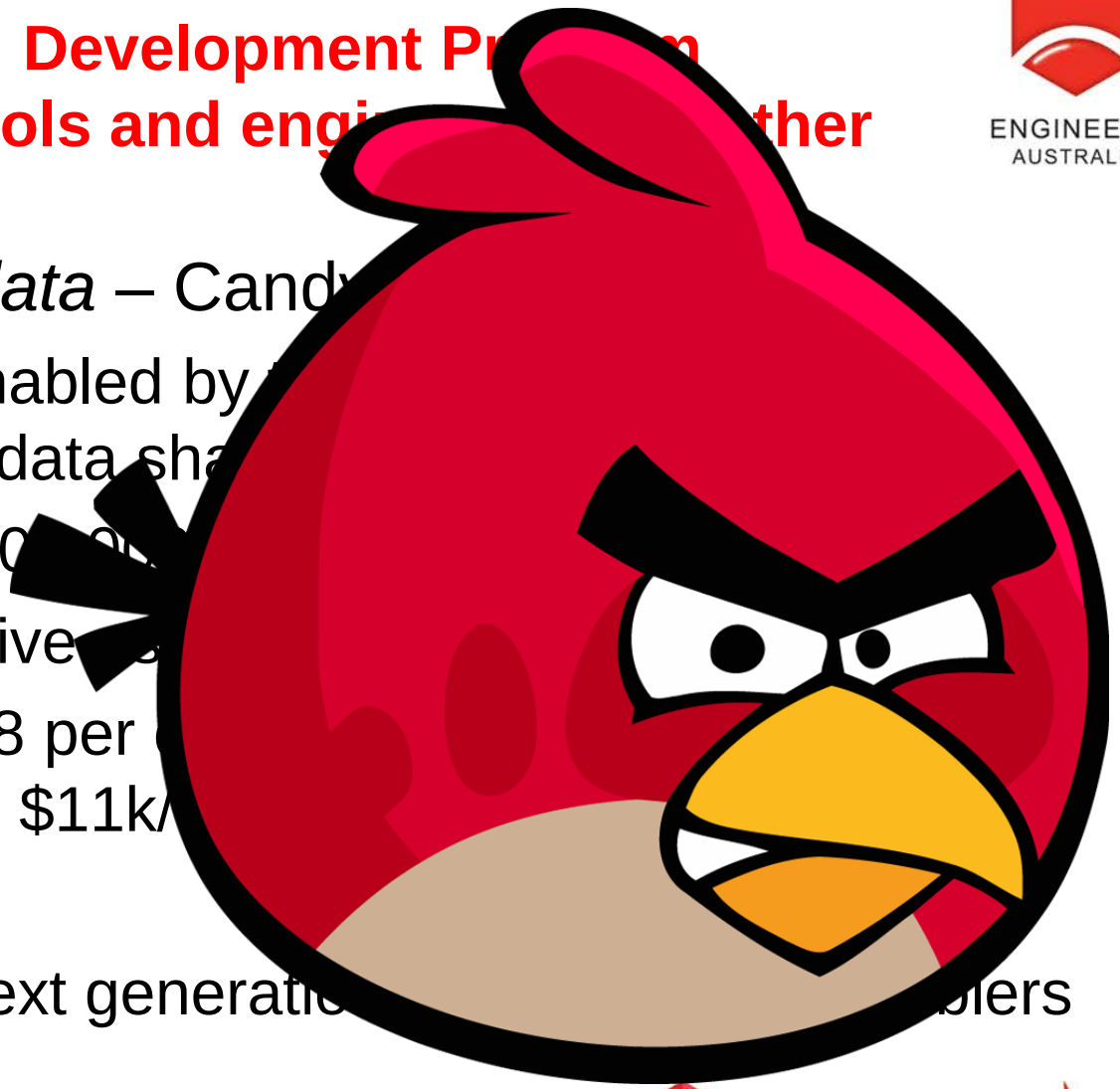

…how to train the next generatio bers


Tumbalong Park
Central St
Liverpool St
Chinese Garden of Friendship
Dixon St
George St
Exhibition Centre
Pier St
Goulburn St
Powerhouse Museum
Hay St
Qantas Credit Union Arena
Campbell St
Pitt St
Paddy's Markets
Darling Dr
Harris St
Ultimo Rd
Hay St
Belmore Park
TAFE
Thomas St
Pitt St
Central
UTS Alumni Green
George St
Lee St
Broadway
Sydney Railway Square YHA
Chalmers St
Goold St
Kensington St
Randle St
Chippendale Green

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Metadata – mobile phone towers

- Where you work..
- Where you live.. when you are away..
- Who you talk to.. for how long.. how often..
- Where *they* work, live, eat; and therefore *what* you talk about

…Big Brother really is watching

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SOME CASE STUDIES…

FROM AMPCONTROL

Alexander Graham Bell, 1892

New York to Chicago

Applicable Standards

Telephony Standards

- *AS/CA S004:2013*; Voice performance requirements for Customer Equipment
- *AS/CA S008:2010*; Requirements for customer cabling products
- *AS/CA S003.1:2010*; Requirements for Customer Access Equipment for connection to a Telecommunications Network
- *AS/NZS 60950:2011*; Information technology equipment – Safety
- *AS/NZS CISPR 22:2009*; Information technology equipment - Radio disturbance characteristics – limits and methods of measurement
- *ITU-T P.350*; Handset dimensions
- *ITU-T P.161*; Arrangement of digits, letters and symbols
- *ETR-051*: Usability checklist for telephones

Applicable Standards

Hazardous Areas

- *AS/NZS 60079.0:2012* or *IEC 60079.0:2011*;
  Explosive atmospheres - Equipment - General requirements
- *AS/NZS 60079.11:2011* or *IEC 60079.11:2011*;
  Explosive atmospheres - Equipment protection by intrinsic safety
- *AS/NZS 60079.14:2009* or *AS/NZS 2381.7;*
  Electrical installations design, selection and erection
- *AS/NZS 60079.25:2011;*
  Intrinsically safe electrical systems

Architecture

Signalling

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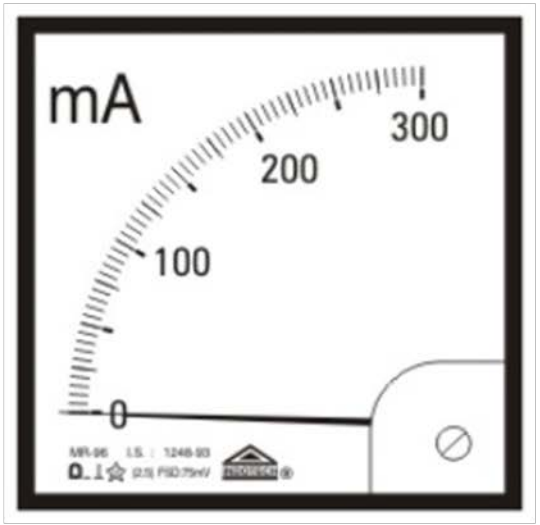
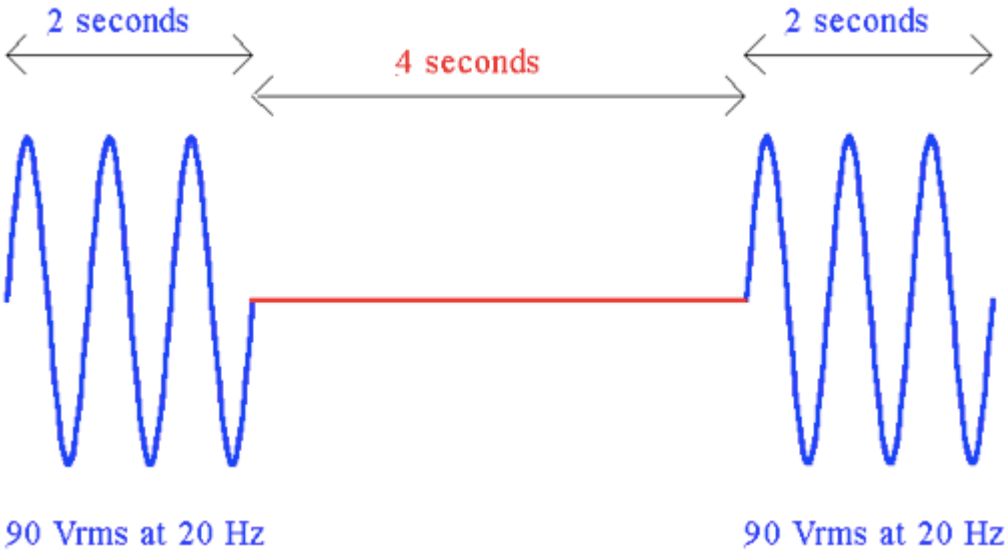
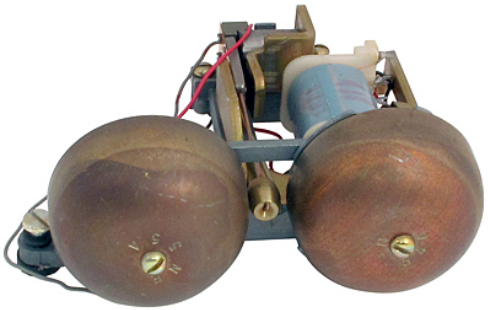
Hook Detection

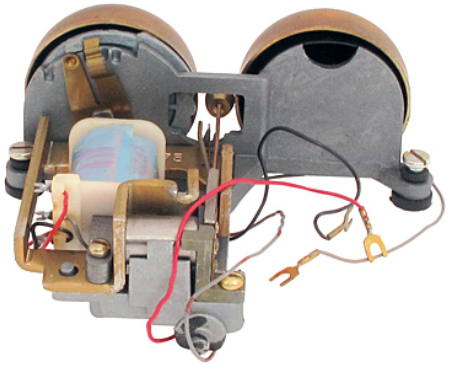


Signalling

Ringing

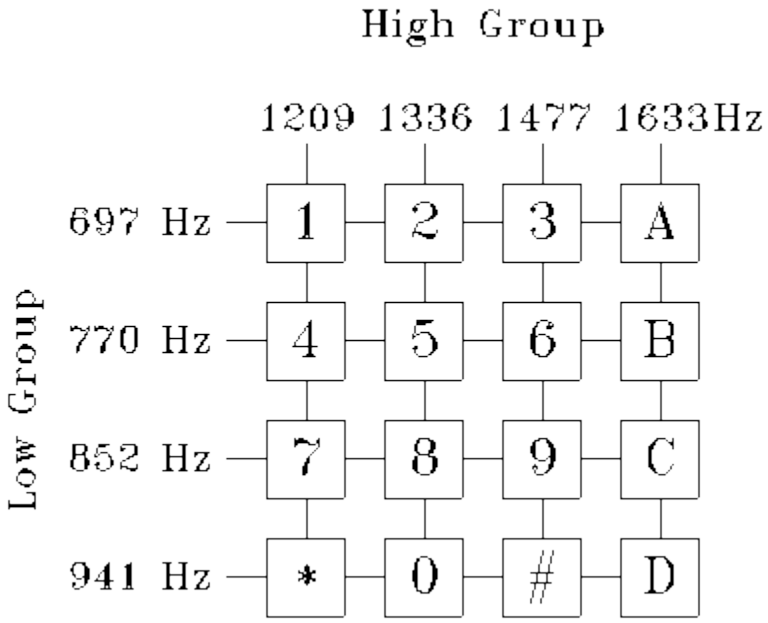


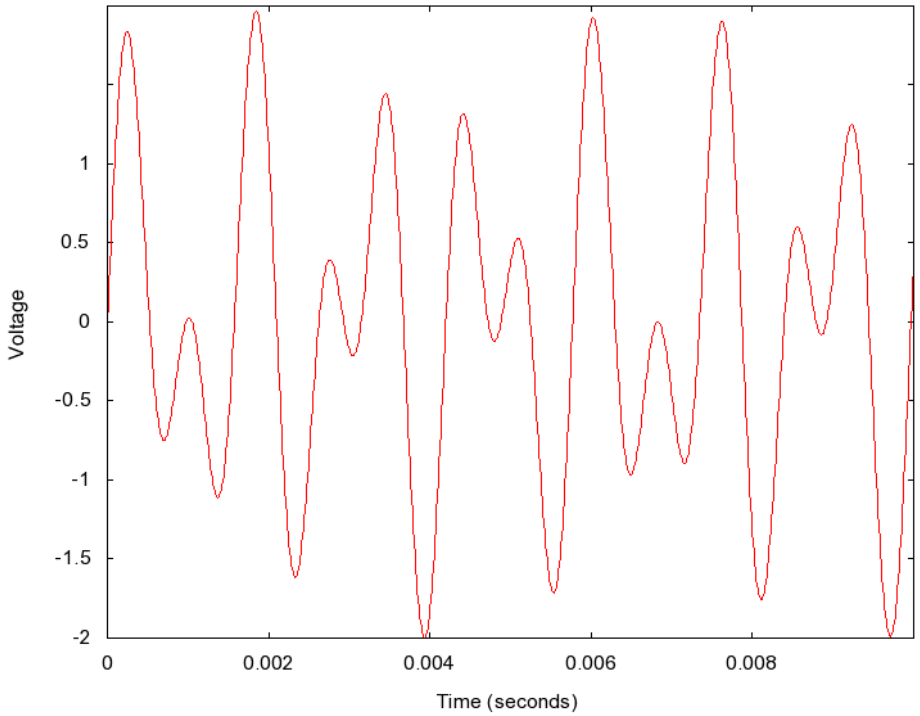




Signalling

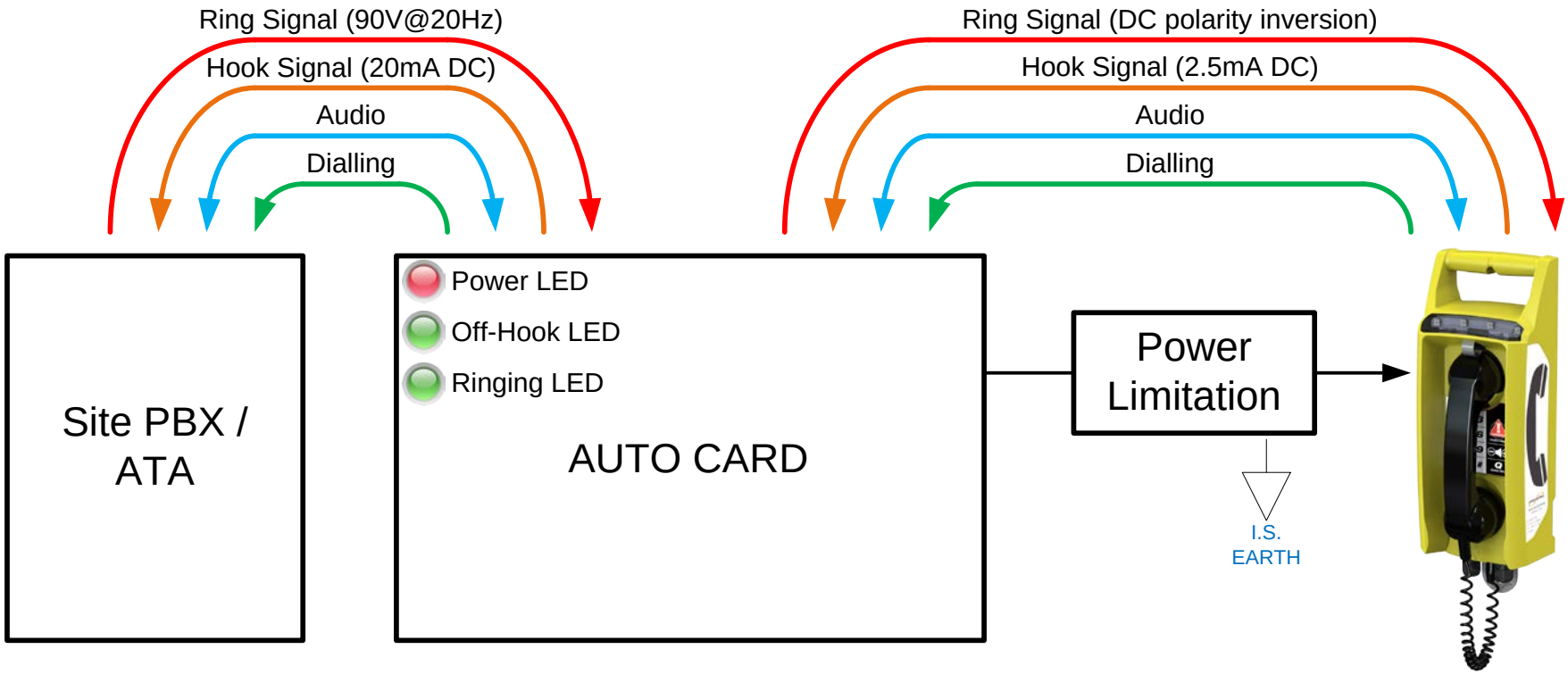
Dialling – Dual Tone Multi Frequency





Signalling

Translating that to I.S. Phones…



Audio performance

S004 – Voice Performance Requirements

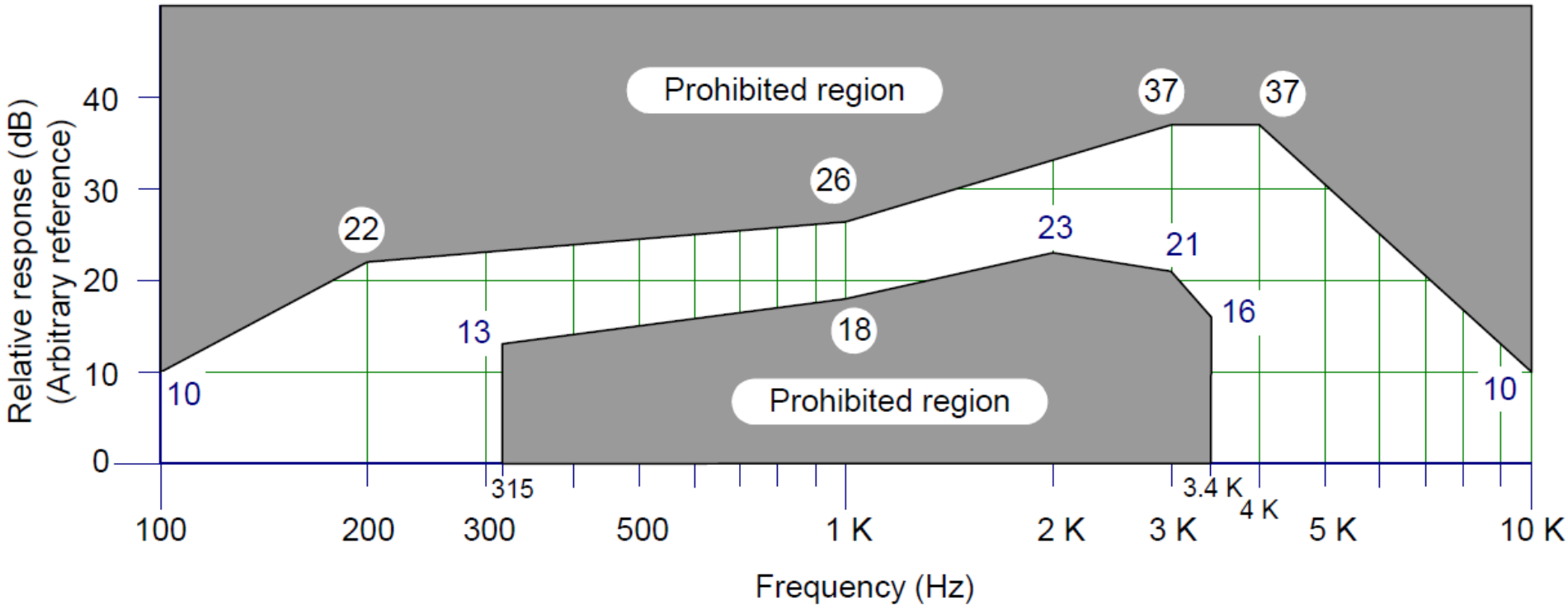


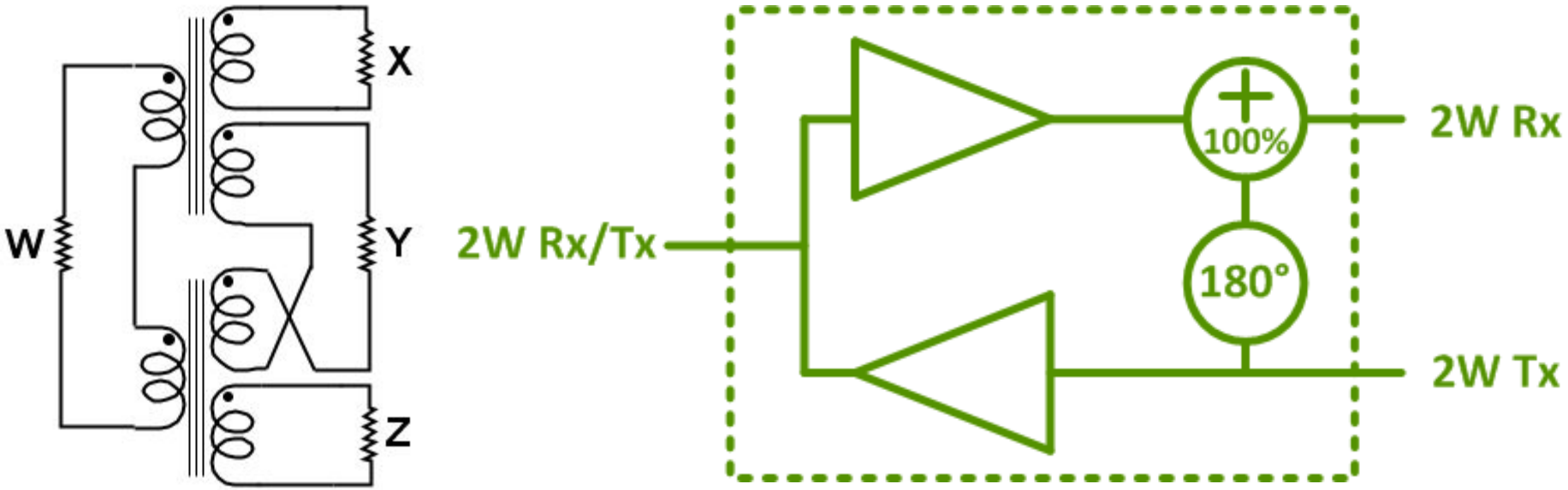
Figure 2

Send frequency response mask for handset
(Analogue Interface – 1.6 km of 0.40 mm copper cable)

Hybrid operation

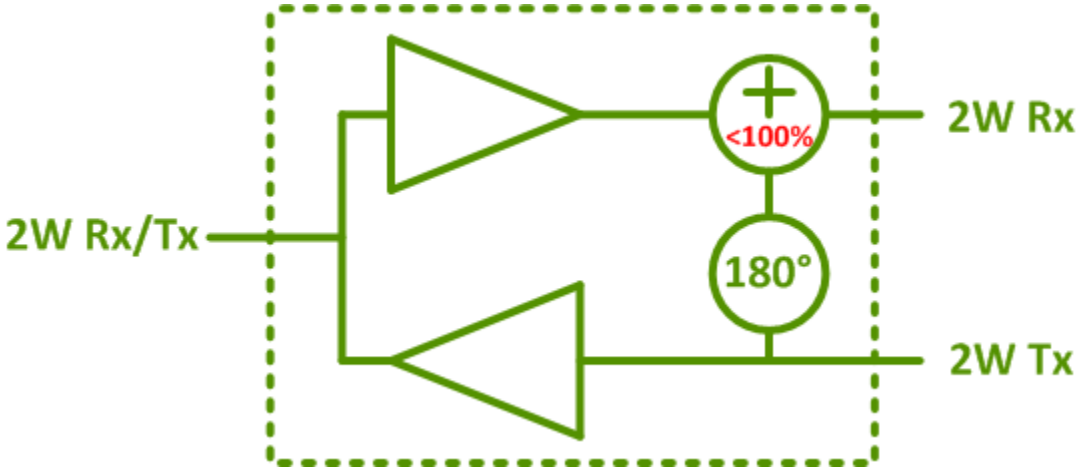
2-wire to 4-wire conversion

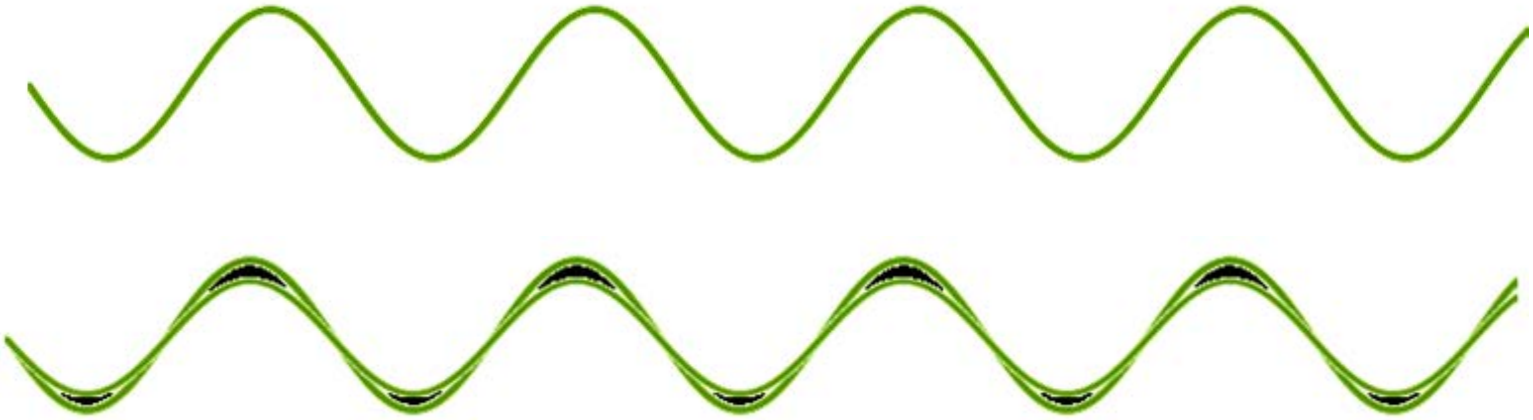
Note: 100% echo cancellation shown



Hybrid operation

Sidetone – amplitude control





Hybrid operation

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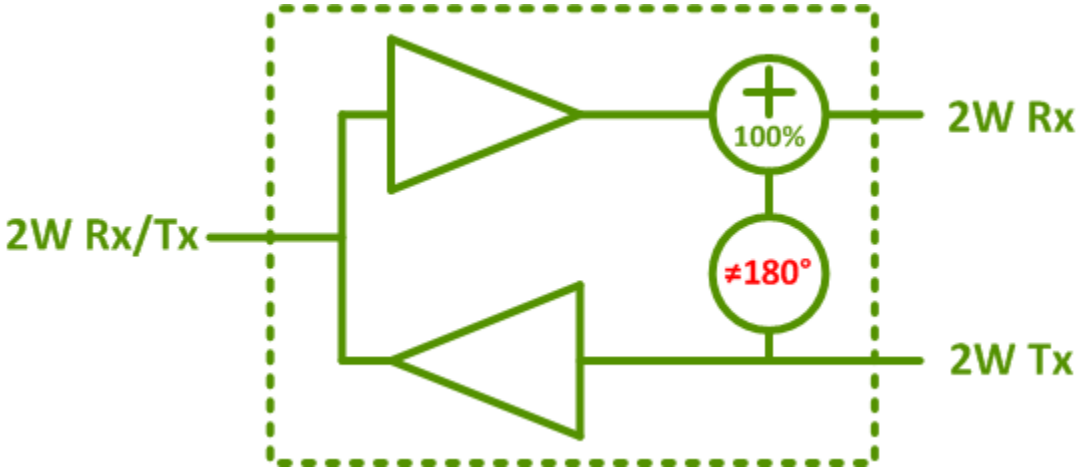
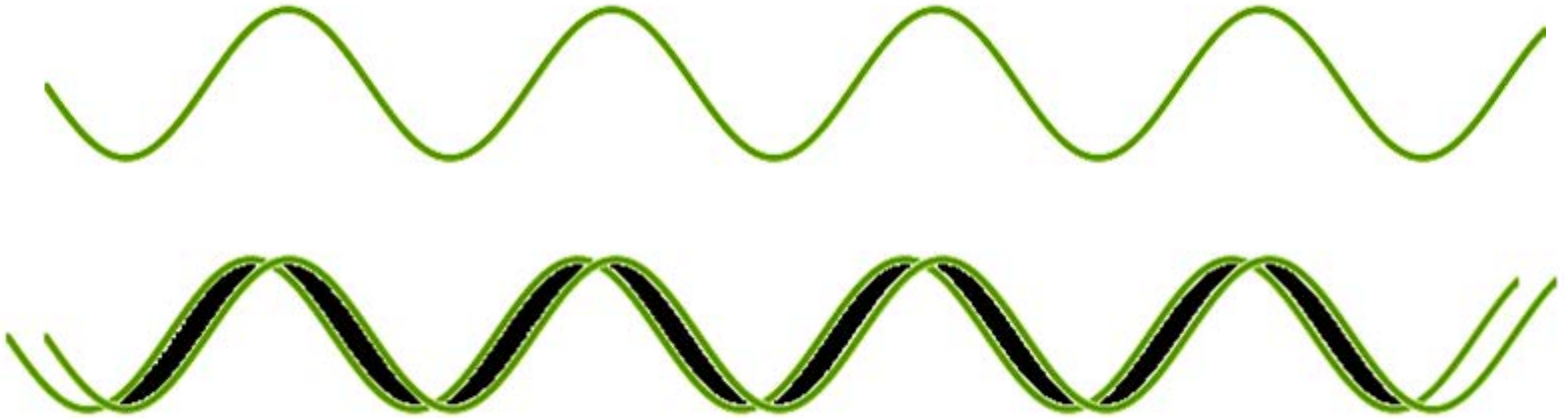
Sidetone – phase control





INTRODUCING

H3ROE

HARSH ENVIRONMENT RETICULATED OPTICS

Harsh Environment Reticulated Optics

Harsh Environment Reticulated Optics

H3RO BOTS

H3RO CABLES

H3RO BULKHEADS

H3RO MOUNTING

Harsh Environment Reticulated Optics

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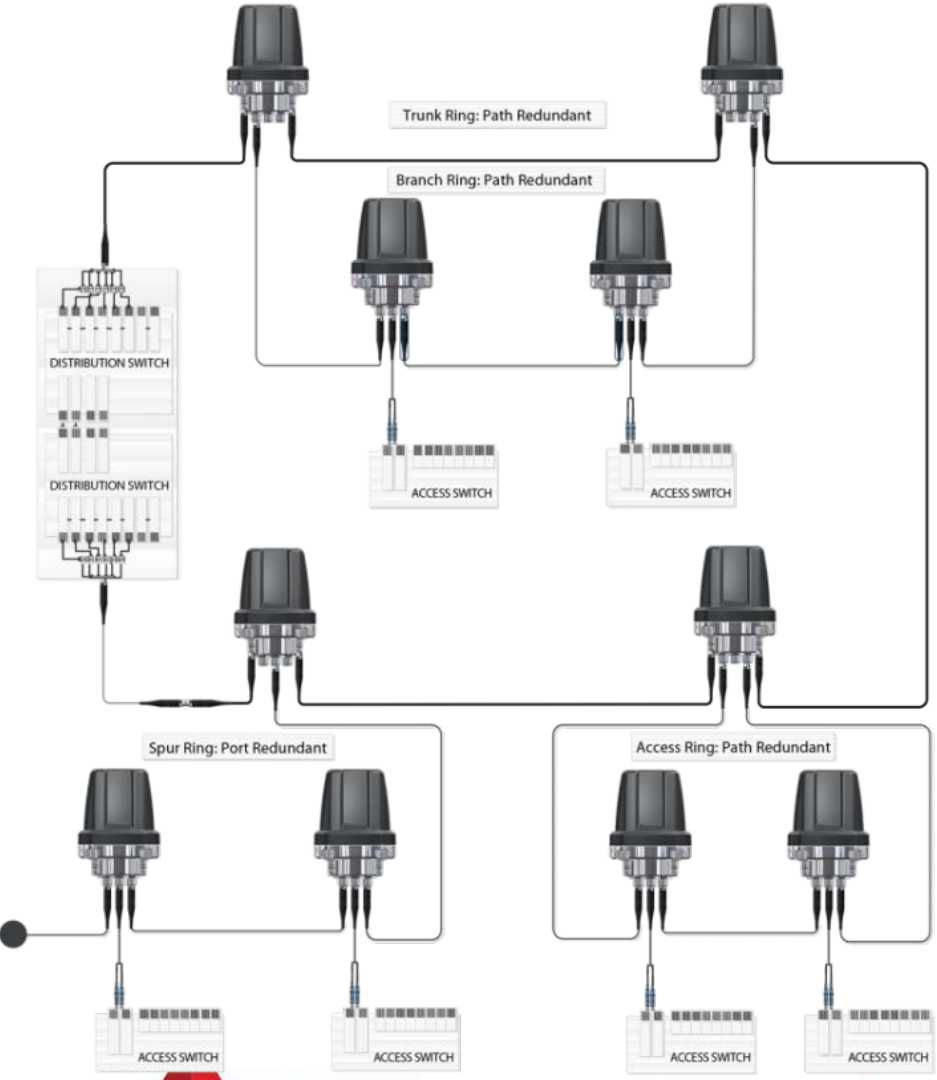
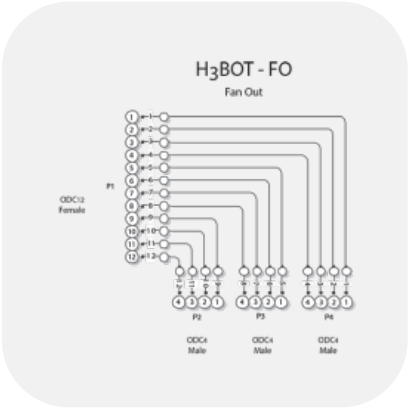
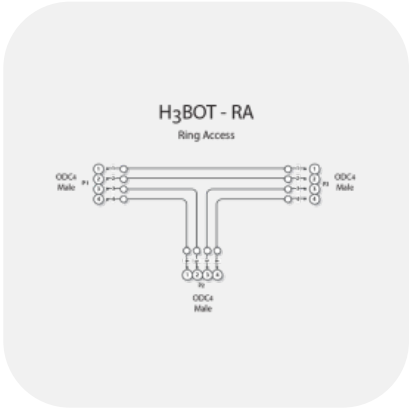
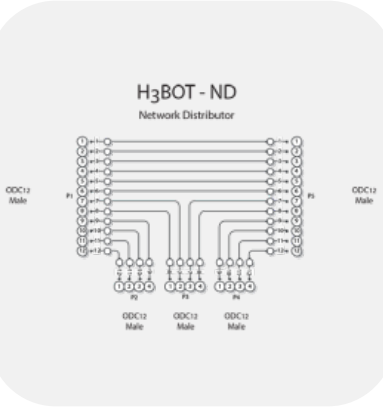
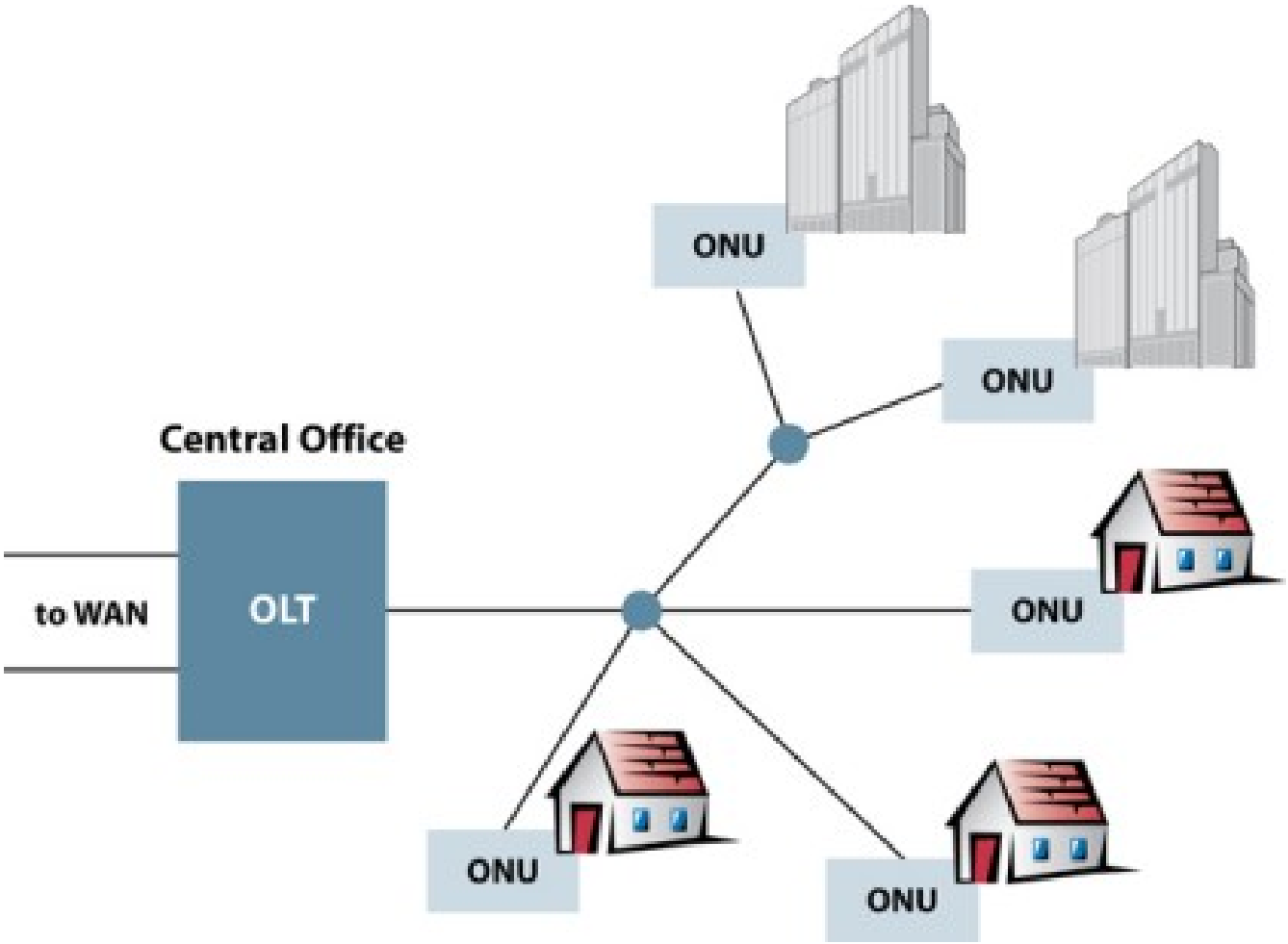








Harsh Environment Reticulated Optics - PON



Harsh Environment Reticulated Optics - PON

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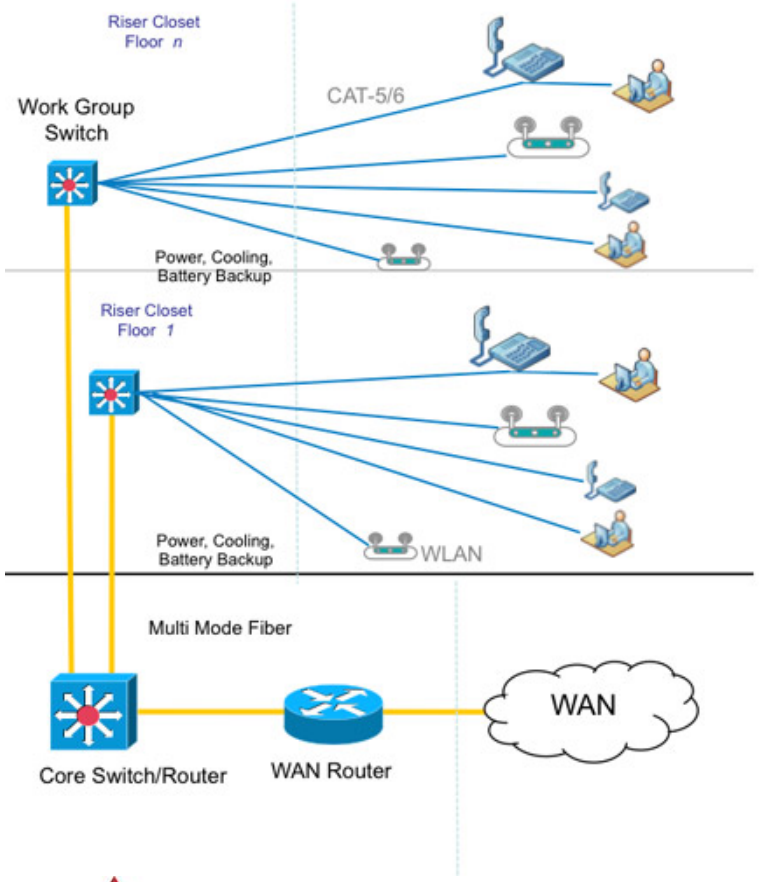
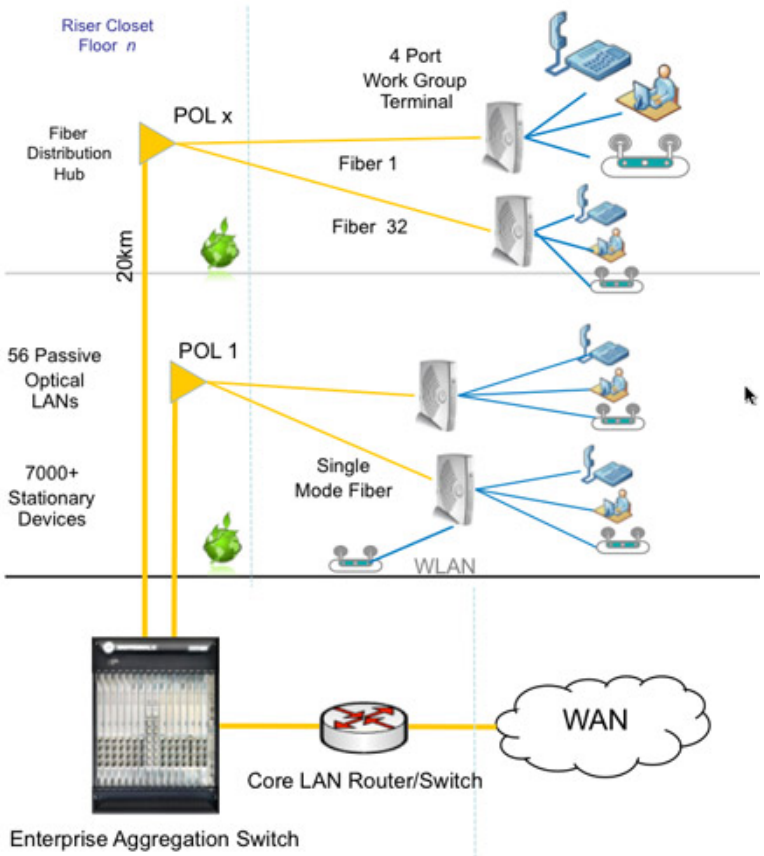
Traditional LAN



Passive Optical LAN



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SOME CLOSING COMMENTS…

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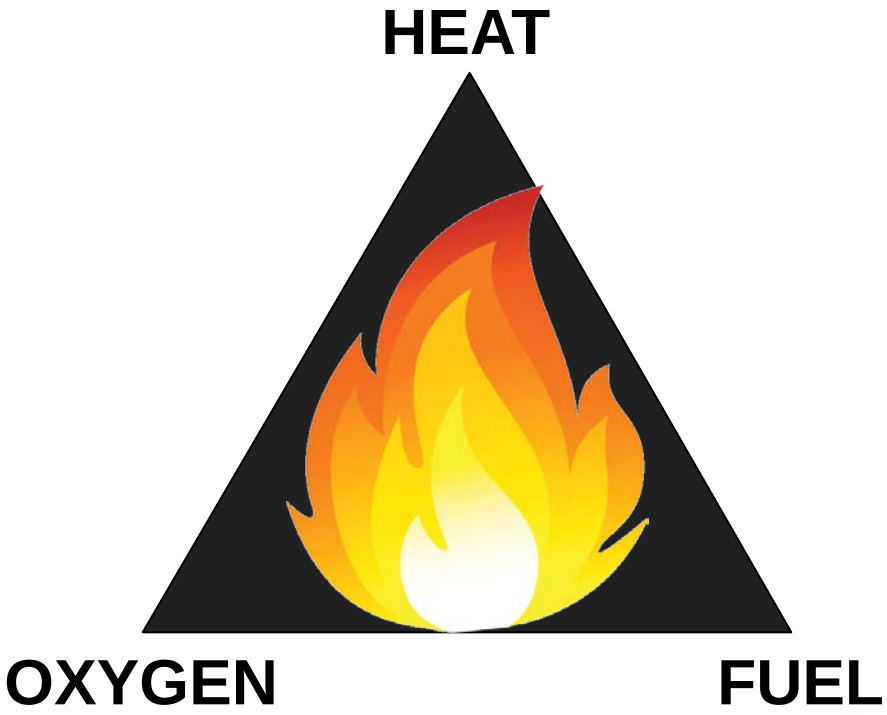
The most common ethical issue: the OTHER infernal triangle…



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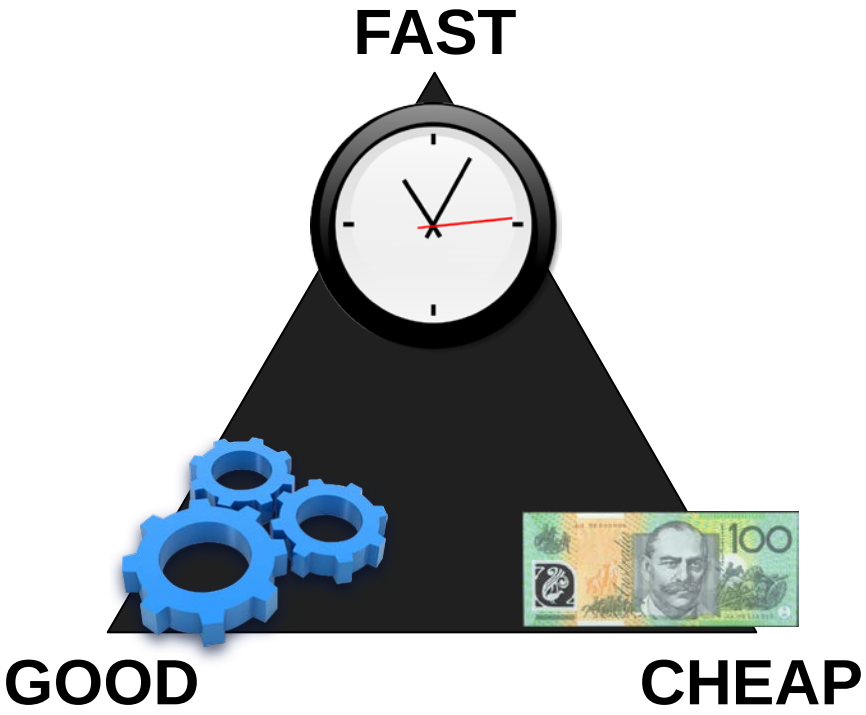

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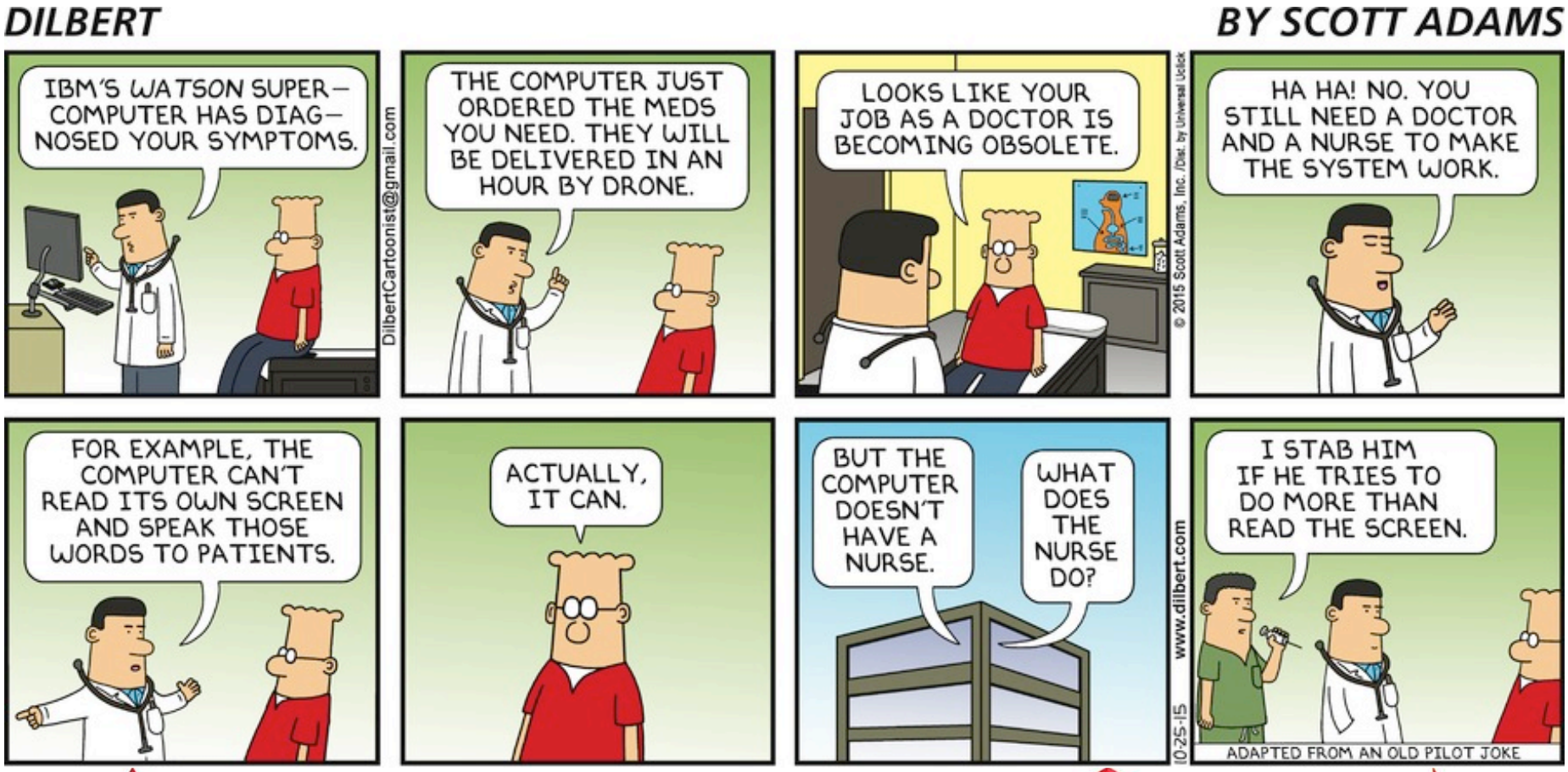

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