

# Starter Kit

# Mobile Telephone Evidence

Presenter - Gregory Smith Trew MTE

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Part 2

Trew & Co (Trew MTE)  
Tel: 020-8460 8034  
Fax: 020-8464 7726  
Email: [trewCO@compuserve.com](mailto:trewCO@compuserve.com)

## TREW MTE

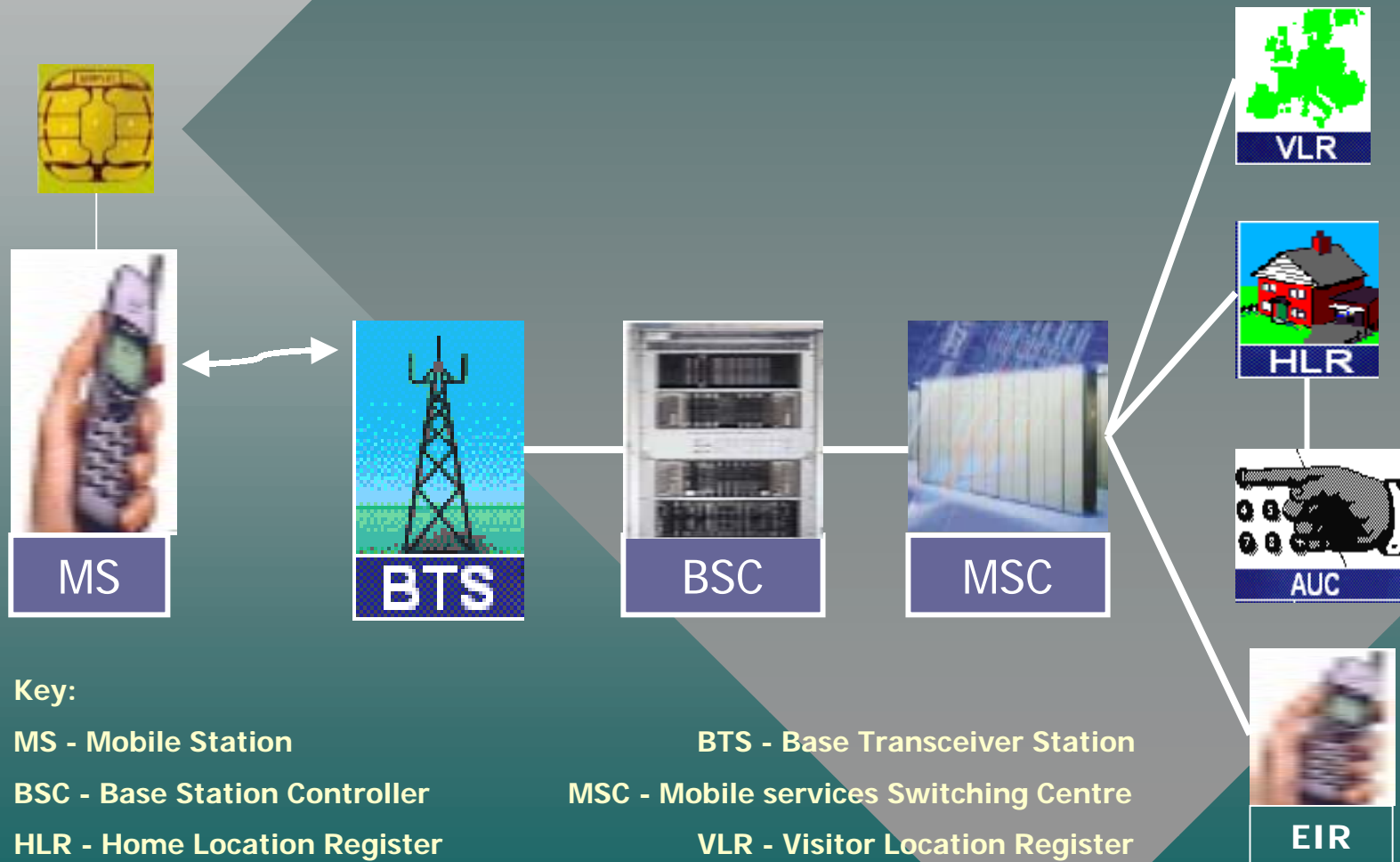
Mobile Telephone Evidence  
Training

# Pro's and Con's of Mobile Telephone Evidence

Defence lawyers faced with evidence identifying mobile telephone calls, generally speaking, would do well to remember that everything in GSM is connected, thus every component has a part to play.

In this regard, the following description may assist as it may help defence lawyers to understand why all the evidence, whether served or in the unused bundle, should be looked at as opposed to merely looking at billing records and ignoring the rest.

# Global System for Mobile (GSM) Communication System component parts



## Key:

MS - Mobile Station

BSC - Base Station Controller

HLR - Home Location Register

AUC - Authentication Centre

BTS - Base Transceiver Station

MSC - Mobile services Switching Centre

VLR - Visitor Location Register

EIR - Equipment Identity Register

# Mobile Telephone Evidence

- A **SIM card** is required to validate the subscriber to the network and authenticate the user so as to allow calls to be made or received, but the SIM can do no more without a mobile telephone
- A **mobile telephone** has a power supply, keys for dialling 'phone numbers and the radio circuitry in order that the SIM and handset can communicate to the mobile network.
- When operating together the SIM card and mobile telephone are known as a **Mobile Station (MS)**.

# Mobile Telephone Evidence

- A **Mobile Station (MS)** talks to a **Base Transceiver Station (BTS)**, the Mast so to speak, when it is within range of it. Radio coverage propagated from the Mast can be omni-directional (360 degrees) or sector directed (degrees). To determine the radio coverage area requires **best server plots/density maps** and **single cell predication maps** to comprehend the RF footprint of the coverage from the Mast.
- There maybe many Masts in a particular geographical area and all will be controlled by an allocated **Base Station Controller (BSC)**.

# Mobile Telephone Evidence

- A **Base Station Controller (BSC)** can be considered a commander of an army (of Masts) under its control to assist mobiles handover between Masts in an area. BSC also acts as the conduit for the Mobile Station to talk with the mobile telephone exchange known as the **Mobile services Switching Centre (MSC)**. The MSC confers with the **Home Location Register (HLR)** to validate the subscriber and the HLR obtains authentication from the **Authentication Centre (AuC)** to allow calls. The MSC equally confers with the **Equipment Identity Register (EIR)** to ensure handset is not barred. All confirmations (HLR/AuC/EIR) are deposited in the **Visitor Location Register (VLR)** to enable the MS to make/receive calls.

# Pro's and Con's of Mobile Telephone Evidence - Calls

## **MOBILE CALLS**

# Pro's and Con's of Mobile Telephone Evidence - Calls

- High degree of certainty that a call was made or received on subscriber's account. Always possible that errors can occur, but the error rate is far outweighed but the high rate of successful/chargeable calls.
- Low degree of certainty as to actual content of call (voice conversations) and reason for caller dialling a number (R .v. Deakin cf R .v. Quarishi)
- Interception may impact on voice content (R.v.Black(Wayne))

# Pro's and Con's of Mobile Telephone Evidence - Calls

**DATA FROM SIM  
CARDS AND  
HANDSETS**

# Pro's and Con's of Mobile Telephone Evidence - Calls

- Evidentially, data on a SIM card can have a higher evidential weight than data on a mobile telephone (handset).
- Subscriber profile recorded in SIM (IMSI) - additionally Subscriber's 'phone number (MSISDN) recorded in SIM but user can overwrite phone number so needs to be checked for accuracy
- Ciphering key, Location and Broadcast Control Channel info system (useful for geographical location)
- Services that may be access via the SIM card's SIM Service Table (SST) - (send/download images, send emails etc)
- Forbidden networks which Subscriber's SIM may not use (useful in cases where Roaming abroad is relevant)  
...and much more

# Pro's and Con's of Mobile Telephone Evidence - Calls

- Handset evidence provides an illustration of handset use and data passed to it from SIM. Handsets record data to SIM so a need to check for accuracy regarding data input by user
- SMS text messages (stored in handset and SIM) - with SIM 'deleted' text messages can be recovered. Text messages on handset can be altered so difficult to detect alteration
- Phonebook (both handset and SIM have their own phonebooks)
- Last Numbers Dialed (LND) on SIM has a higher weight as this data generated in SIM occurs from user selecting a name/number in SIM. Handset LND susceptible to alteration
- Last Number Received (LNR) and Missed (LNM) found on handset susceptible to alteration - if shown to be accurate, can have a higher evidential weight

# Pro's and Con's of Mobile Telephone Evidence - SMS

Something to bear in mind about SMS text messages

- Provided message is shown not to have been altered (thus genuine) then if the content of a message is so patently clear and obvious, can provide for good evidence
- In many cases a reply to a text message originally sent/received may not be recovered. A single ambiguously written text message by itself does not 'establish' the complete conversation between two parties - its evidential weight therefore requires particular attention to detail

# Pro's and Con's of Mobile Telephone Evidence - Call Records

## **CALL RECORDS**

# Pro's and Con's of Mobile Telephone Evidence - Call Records

- Do remember there is legislation that requires billing records to be accurate S25 Telecommunications Act 1984 - "approved metering systems"
- There are Standards in place requiring performance levels to be achieved regarding assessing accuracy of each call data record OTR003 and later Standards that supplement OTR003 - if defence lawyers are not sure - contact OFCOM
- Equally, as GSM is international, then agreements for charges and payments needs to be on a firm footing - the IOT (Inter-Operators Tariff) and the requirements of TAP (Transfer Account Procedure) Files for international settlements.

# Pro's and Con's of Mobile Telephone Evidence - Call Records

- Subscriber billing records/Call records are used as the cornerstone to establish that mobile calls were made/received - these records may be accurate
- However, inaccuracy can occur when original data is transported and imported into a compilation document. The defence lawyer thinks s/he is looking at original material when in fact its compilation
- **Always insist on original material in order to check accuracy of compilation**

# Pro's and Con's of Mobile Telephone Evidence - Call Records

- For Monthly Account holders ensure Subscriber billing records have been served
- For Monthly and Prepaid Account holders ensure that original Call records have been served
- There are various types of Call Records generated by mobile operators and the following lists may be of use:
- **CDR (Call Detail Record)** there is **one for each and every** mobile originated call (**outgoing call**) and mobile terminated call (**incoming call**)

# Pro's and Con's of Mobile Telephone Evidence - Call Records

- **Call Records** that combine data from CDRs for a daily, weekly, monthly period - these are the usual records served in evidence. Some useful CDR data can be stripped out before being compiled in Call Records
- Dependant upon the type of case **always seeks** CDRs for particular calls that are highly relevant to a case and for **all other calls** seek Call Records
- However, Operators' include varying types of data in Call Records and some Operators can give special identities to these records - Vodafone has a data-rich file about mobile calls called the "**Gold File**" and very informative it is too!

# Pro's and Con's of Mobile Telephone Evidence - Calls

- Importantly do remember that itemised Call Records do not always corroborate data appearing in handset memory Last Numbers Dialed (LND)
- Telephone numbers appearing in LND can occur simply by pushing keys on the keypad, selecting number that is not sent and so on
- Also evidence of SMS text messages from handsets are not enough to substantiate they have been sent. Although often only the messages are served in cases of harassment or death threats. Only the Call Records can confirm whether a message may have been sent or not

# Pro's and Con's of Mobile Telephone Evidence - Call Records

- It is common to find in some Call Records details of the Mast used for each mobile call.
- Called the Cell Information these details provide a useful indicator of the geographical area where the mobile telephone located at time of call
- Useful from the point of view that the details indicates where the defendant wasn't - anywhere outside of the radio coverage from a Mast.
- These details may not be accurate down to meters as a Mast's coverage may spread of many Miles(kms).

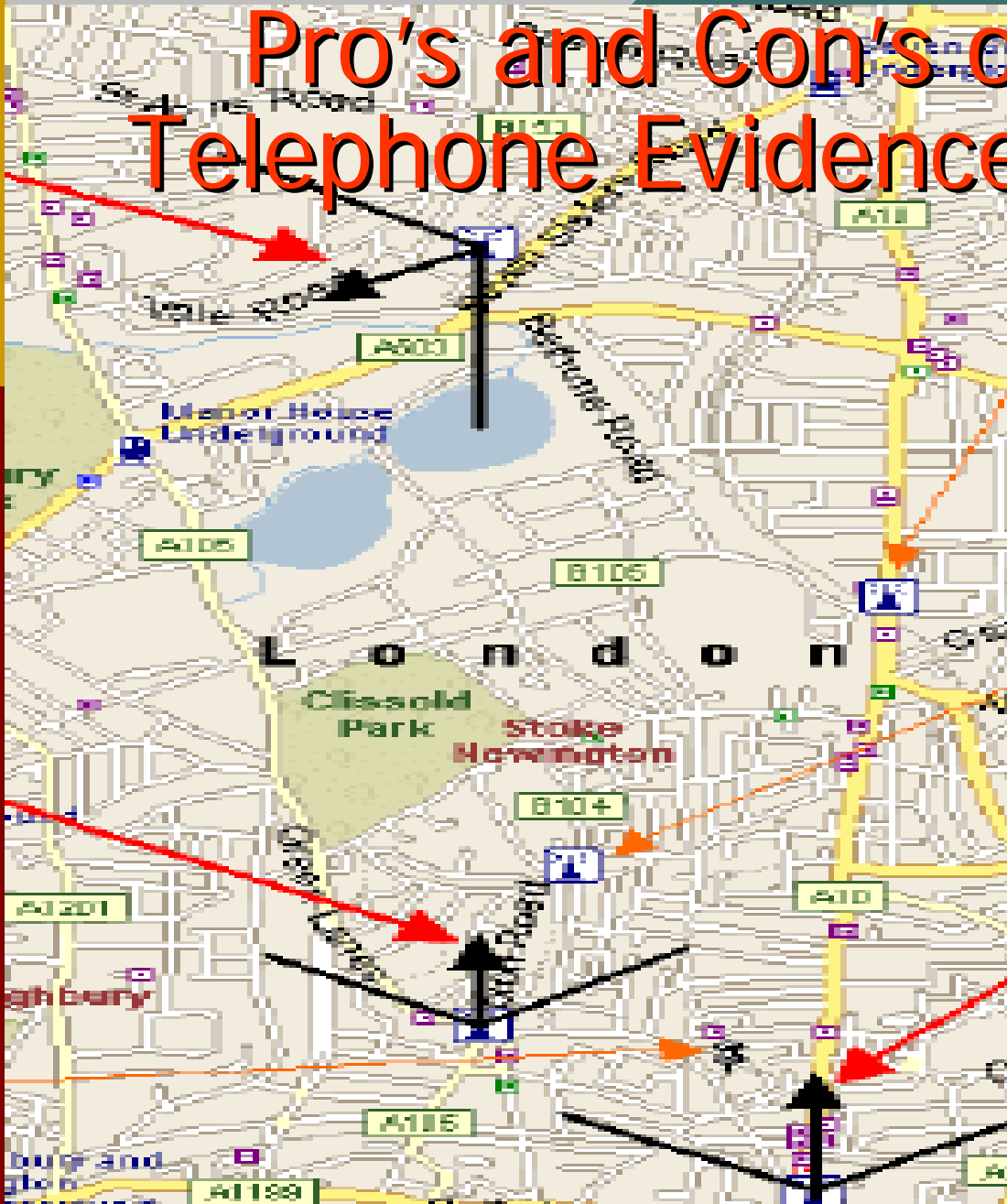
# Pro's and Con's of Mobile Telephone Evidence - Cell Site

## **CELL SITE EVIDENCE**

# Pro's and Con's of Mobile Telephone Evidence - Cell Site

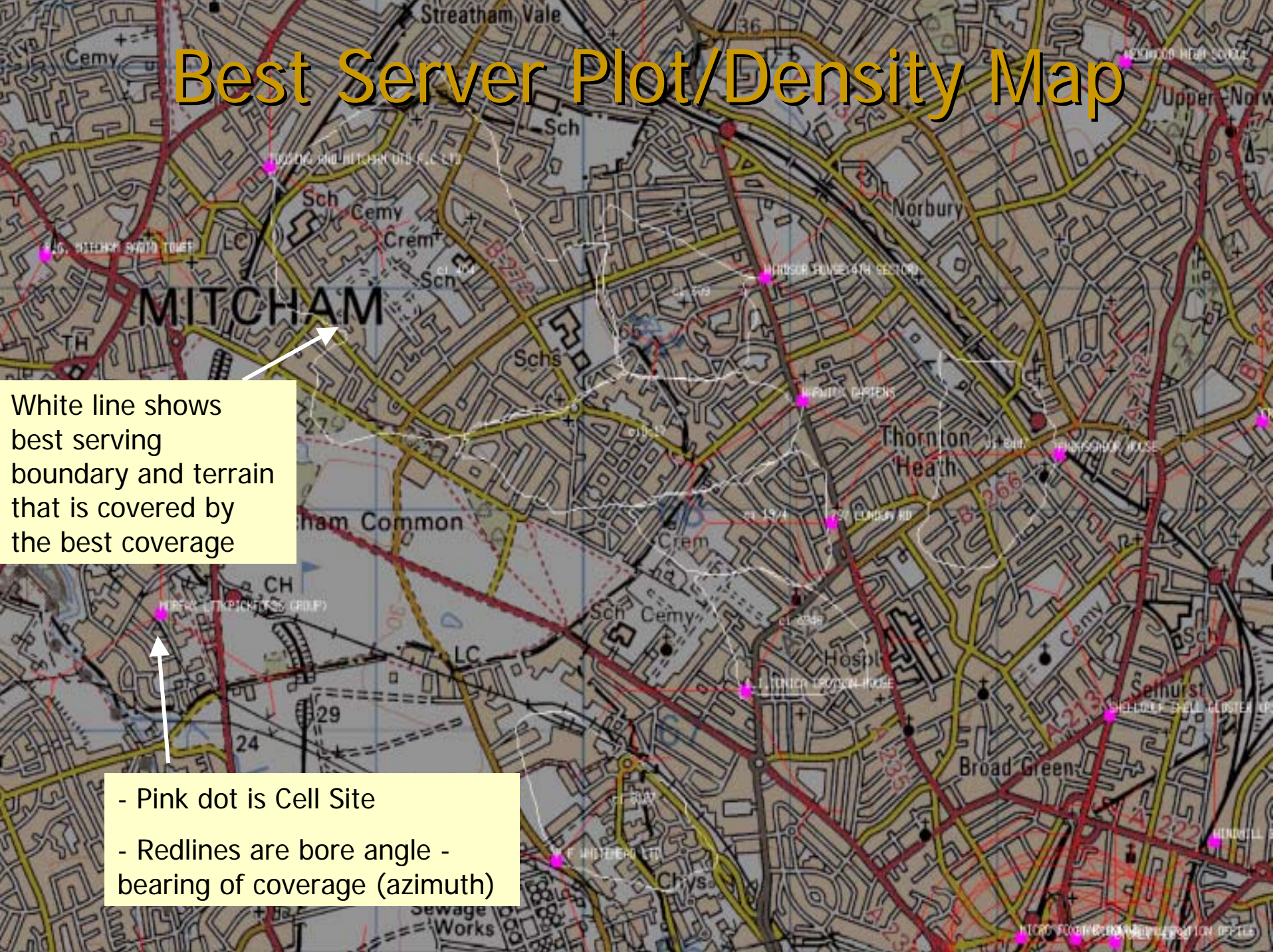
- The key to determining radio coverage at first instance is to have original and genuine information from the mobile network operator identifying the RF footprint
- **Best Server Plot/Density Map**
- **Single Cell Predication Map**
- Problematical to the law of evidence it has allowed itself to be beguiled by **compilation** documents which have **gained currency in criminal proceedings as some form of substantive evidence** - namely autoroute call mapping containing little or no original statement of fact in them from the Mobile Operator.

# Pro's and Con's of Mobile Telephone Evidence - Cell Site



- Whilst autoroute call mapping may be a helpful compilation it does not identify radio coverage boundaries or how far radio coverage travels from the Mast.
- Juries are being denied important evidence upon which they can make their minds up - up until 1999 there was not the problem - **so why does the law of evidence believe the following Plots/Maps are not relevant ???**

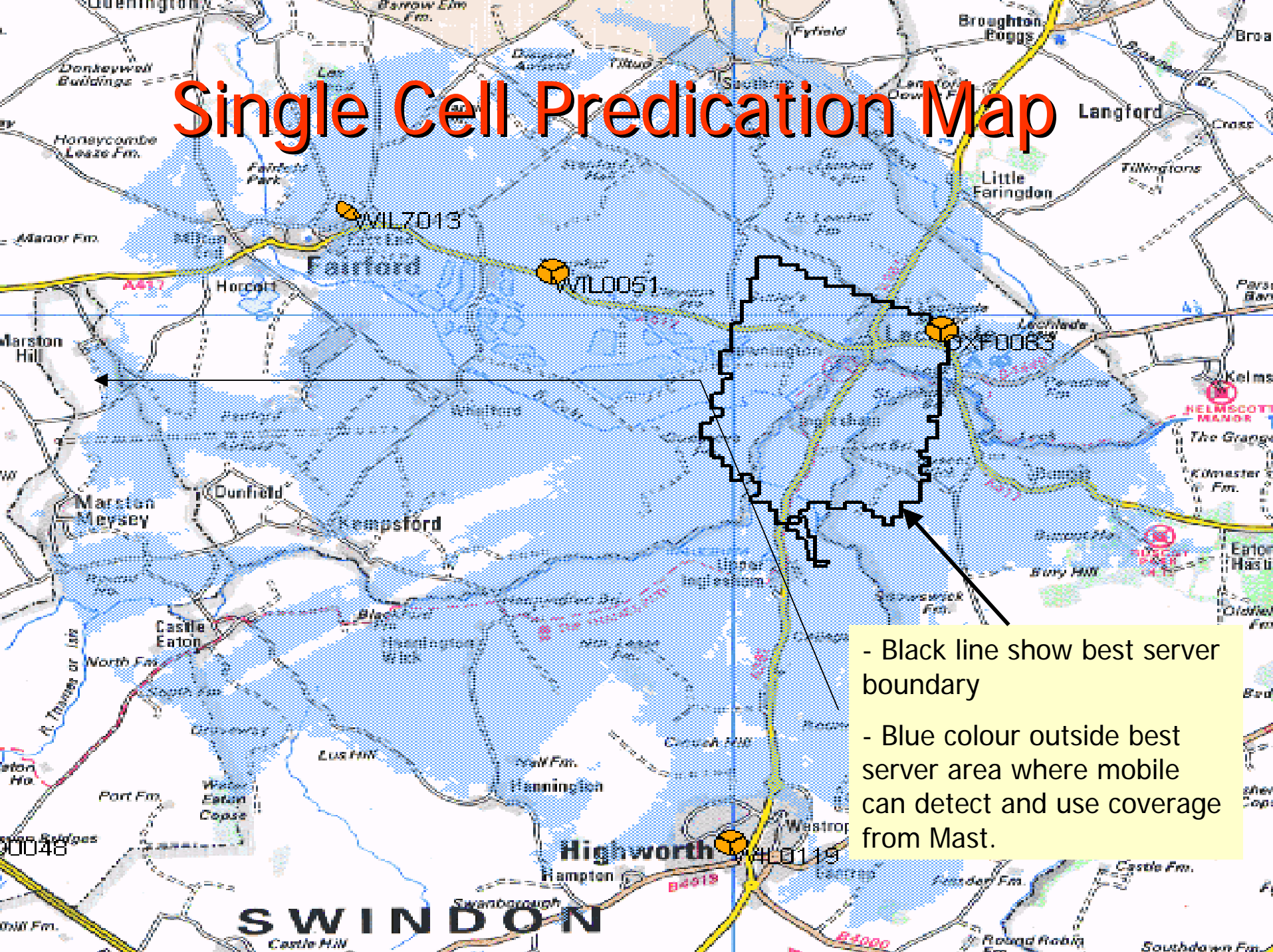
# Best Server Plot/Density Map



White line shows best serving boundary and terrain that is covered by the best coverage

- Pink dot is Cell Site
- Redlines are bore angle - bearing of coverage (azimuth)

# Single Cell Predication Map



- Black line show best server boundary

- Blue colour outside best server area where mobile can detect and use coverage from Mast.

# Pro's and Con's of Mobile Telephone Evidence - Cell Site

- A germane and relevant question for defence lawyers - which of the maps you have been shown do you think would give the defendant a **fairer trail** regarding the technical evidence?
- **Best Server Plot/Density Map?**
- **Single Cell Predication Map?**
- **Autoroute Call Mapping?**
- The Plots/Maps have been in evidence since 1993. Autoroute call mapping in evidence started 2000 are economical with radio coverage reality and deprive a defendant of fairness by stifling technical evidence (cf R.v. Judith Ward 1992)

# Pro's and Con's of Mobile Telephone Evidence - Cell Site

- Other aspects regarding cell site data in Call Records that can be of interest to note:
- T-Mobile (One2One) do not record the Mast upon which a mobile call terminated - thus making it difficult to identify the movement of a mobile phone between locations
- mm02 (BT Cellnet) use omni-directional Masts (360 degrees) so can be difficult to identify from which direction the mobile is travelling
- Orange and Vodafone cell data probably are the best in terms that they provide more useful data about all Masts used than mm02 or T-Mobile

# In PART 2

- An refresh on the GSM components parts
- Touched upon varies reliability of evidence from SIM cards and handsets
- A review of various call records was highlighted
- Problems with poor quality evidence regarding cell site analysis was raised
- There is lots more that can be said on this subject matter but that would require more time than this hour-long presentation permits

# Possible Future CPD Topics

- Interception of Mobile Communications
- Interpreting Call Records/Mobile Telephone Data
- Future 3G mobile telephone evidence and the shock in store for the law of evidence
- Criminal Cases and Mobile Telephone Evidence

**END OF PART 2**

**THANK YOU**

**ANY QUESTIONS?**