

Cell Site Analysis and Expert Opinion

Exhibit Reference:	1026731/MST/1/290926/Other Party
Client / Prepared for:	Omagh Bombing Inquiry
Expert:	Dr Matthew Stephen Tart
Lab Reference:	CCL1026731
Client Reference:	OBI
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- 1 Expert Witness Declaration of Understanding
 - 1.1. This report has been compiled from information provided to me by Omagh Bombing Inquiry. I reserve the right to re-examine my findings should any of the information furnished be incorrect or be the subject of change at any time in the future.
 - 1.2. I, Dr Matthew Stephen Tart, am an expert in Cell Site Analysis and I have been requested to provide an analysis and statement. I produce my Report in accordance with Part 35 of the Civil Procedure Rules and in the knowledge that my evidence is impartial and independent.
 - 1.3. In accordance with my duties of revelation, as documented in the guidance booklet, I Dr Matthew Stephen Tart DECLARE THAT:
 - 1.3.1. I understand that my duty is to help the Chairman to achieve the overriding objective by giving independent assistance by way of objective, unbiased opinion on matters within my expertise, both in preparing reports and giving oral evidence. I confirm that I have complied with and will continue to comply with that duty.
 - 1.3.2. I confirm that I have not entered into any arrangement where the amount or payment of my fees is in any way dependent on the outcome of the case.
 - 1.3.3. I know of no conflict of interest of any kind, other than any which I have disclosed in my report.
 - 1.3.4. I do not consider that any interest which I have disclosed affects my suitability as an expert witness on any issues on which I have given evidence.
 - 1.3.5. I have shown the sources of all information I have used.
 - 1.3.6. I have exercised reasonable care and skill in order to be accurate and complete in preparing this report.
 - 1.3.7. I have endeavoured to include in my report those matters, of which I have knowledge or of which I have been made aware, that might adversely affect the validity of my opinion. I have clearly stated any qualifications to my opinion.
 - 1.3.8. I will notify those instructing me immediately and confirm in writing if for any reason my existing report requires any correction or qualification.
 - 1.4. I understand that:
 - 1.4.1. My report will form the evidence to be given under oath or affirmation and I may be required to attend to give oral evidence to the Inquiry.
 - 1.5. CCL hold UKAS accreditation for Cell Site Analysis.
 - 1.6. I confirm that the contents of this report are true to the best of my knowledge and belief and that I make this report knowing that, if it is tendered in evidence, I would be liable to prosecution if I have wilfully stated anything which I know to be false or that I do not believe to be true.
 - 1.7. I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true.

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2. Author Background

- 2.1. My background is defined in my previous report "1026731/MST/1/270526/Cell Site Analysis".

3. Information and Data Received

- 3.1. I have not received any additional information.

4. Exhibits Produced

- 4.1. I have not produced any additional exhibits.

5. Purpose

- 5.1. I have been asked to review and provide greater detail whether incoming call data on the Eircell Network in 1998 contained "other party" cell site information.

- 5.2. This report should be read in conjunction with:

5.2.1. INQ042459 "1026731/MST/1/270526/Cell Site Analysis".

5.2.2. INQ042460 "1026731/MST1/270526/Cell Site Analysis Principles".

5.2.3. INQ042462 "1026731/MST/2/270526"

5.2.4. INQ048914 "MST/Cell_Site_Analysis_Explanation_260826".

5.2.5. "1026731/MT01/1/270526_References" (which I refer to as "References" in this report).

INQ042461

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6. Assessment – “Other Party” Call Data

6.1. I lay out general caveats concerning “other party” call data in sections 9.1 and 9.10 of my report “1026731/MST1/270526/Cell Site Analysis Principles” (INQ042460). In summary:

6.1.1. There was obvious “other party” data in the Vodafone data considered in my analysis.

6.1.2. I am aware that other networks (Orange and “3”) also included “other party” call data. While these networks are not amongst the data considered for phones in my analysis, it highlights that the “Other Party” cell information feature is not unique to Vodafone.

6.2. I have excluded incoming call events from my assessment as I am not personally confident I can trust the cell site information within those records.

6.2.1. I know that I can’t trust incoming cell information when both phones are using Vodafone.

6.2.2. I do not know whether this concern also applies to the call data for the other non-Vodafone networks in the data received. I cannot recall occasions when I observed “other party” cells for a Vodafone user when the other party was not also using the Vodafone network.

I do not know that the incoming cell data on non-Vodafone networks is definitely “untrue”, just that I can’t be personally confident that the listed cells can be relied upon for the phone receiving the call; I have therefore not directly provided opinion on incoming call events as the reliability of the traces are unknown to me. I would prefer to not give an opinion rather than potentially mislead the Inquiry.

6.3. Normally my cell site analysis is from original “gold copy” CDRs, provided in a format easy to normalise/ analyse (i.e. no need for transcription), originating from networks that I have studied in detail including via experiment, consistency testing and blind trials. The call data considered for this inquiry is not of that nature, it was only available as a large number of scanned documents. The data predates my involvement in the field of Cell Site Analysis and is on networks that either no longer exist or, if they do, not in the same form.

6.4. I have co-authored paper which includes a proposed method for detection of “other party” call data [“References” 1.16, “Cell site analysis; testing understanding via internal consistency checks” <https://doi.org/10.1016/j.scijus.2024.12.002>]. The approach in that paper is best suited to automated methods applied to mass data; I have only been able to apply it to a limited subset of all available data (i.e. there may be data I have not transcribed that could aid clarity).

INQ042490

6.5. While preparing for oral evidence during the Inquiry, I had a new idea that might shed some light on reliability using a different method than that described in “references” 1.16. My additional analysis in this report focuses on phones on the Eircell network.

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6.6. **Inter-network calls.**

6.6.1. From my experience of analysing CDRs over the last couple of decades, I have:

- i) seen inclusion of "Other Party" data on a number of (but not all) UK networks.
- ii) only seen obvious "Other Party" data when both phones were on the same network.

6.6.2. There may be incoming call events within the period of my analysis where the calling phone is on a different network to that called; if so it is my current belief that the called phones (incoming) Cell ID may be trusted. I have reviewed the data to highlight which calls were of this nature.

6.6.3. Knowing the network used by both the called and calling phones is a core requirement for this method. I do not know the networks for all phones in the data, but do know, from page one of a statement from Kevin Dowling dated 14/6/99 (INQ029635) that the Eircell GSM network used the prefix "087" (and that the analogue TACS network used "088"). I can therefore use this as an indicator of whether the phones were, or were not, on the Eircell network. There is a risk with using this approach; it is possible to port phone numbers between networks (i.e. have a contract with one network and be provided a number associated with that network, but change contract and become registered on a different network while retaining the same number). It is therefore possible that a phone with a prefix of "087" originated on the Eircell GSM network but did not remain there.

6.6.4. Phones 087[PD]0498, 087[PD]1076, 087[PD]3980, 087[PD]5585, 087[PD]9971, 087[PD]6456 and 087[PD]4259 all had the prefix 087, associated with the Eircell GSM network.

6.7. **Intra-network calls.**

6.7.1. If the calling and called phones are on the same network, I believe there is potential for "other party" call data. "Other party" data was readily apparent in the roaming Vodafone data (e.g. the "Pigeon Top" vs. "Holyhead" example presented in my "principles" report (INQ042460). There were no such dramatic examples of widely separated masts used in short periods in the Eircell data considered. I have reviewed the data when the calling and called phones are on Eircell to see if the same cell was listed. This may indicate "Other Party" data, but even if the same cell is listed, the phones may both have been in the service area of the listed cell; some cells were believed to have very large service areas.

6.7.2. I have only transcribed call events that were pertinent to the specific questions I was asked. There may be examples demonstrating "Other Party" data in the wider data.

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7. Analysis

I have reviewed the call data for those phones using the networks in the Republic of Ireland (i.e. not when roaming) on 15/08/1998:

7.1. **087[PD]0498**; All calls that I found in the data on 15/08/1998 were outgoing. I trust the cells listed for these events.

7.2. **087[PD]1076**; All calls that I found in the data on 15/08/1998 were outgoing. I trust the cells listed for these events.

7.3. **087[PD]3980**; There were three incoming calls in the data that I have found for this phone on 15th August for which I have cell site data for the calling phone.

7.3.1. There were no "inter-network" incoming calls, all were "Eircell" to "Eircell". The cell listed for both the calling and called phone was the same in the data that I have received. I do not know if the incoming call Cell IDs are definitely "other party" call data but it is possible that they may be:

- i) Phone 087[PD]5585 called 087[PD]3980 at 12:41:30. The Cell ID listed for both 087[PD]5585 and 087[PD]3980 was 27201000C6598, based at Castleblaney.
- ii) Phone 087[PD]5585 called 087[PD]3980 at 13:13:03. The Cell ID listed for both 087[PD]5585 and 087[PD]3980 was 27201000C6592, based at Emyvale.
- iii) Phone 087[PD]5585 called 087[PD]3980 at 15:13:02. The Cell ID listed for both 087[PD]5585 and 087[PD]3980 was 27201000C01d8, based at Stranooden.

7.3.2. The calls are illustrated in a table on page 3 of my exhibit "1026731/MST/2/270526" (INQ042462). The data that I used to generate this table for phone 087[PD]3980 is listed on page 170 of INQ001617. The data that I used for phone 087[PD]5585 is listed on page 104 of INQ001617. The table is a fair reflection of this data.

7.3.3. Analysis by Mr Weeks

Incoming cellsites for 980 are listed in a table in 5441/GP1 (INQ012963_0001-0017-0020). Cell IDs are not listed, and the cell names differ from those that I have found in the data I have received. The cellsites listed by Mr Weeks are:

- i) 12:41:30; "Clermont Carn" (as opposed to "Castleblaney" in my data). "Clermont Carn" and "Castleblaney" are different cell sites.
- ii) 13:13:03; "Ely, Emyvale" (as opposed to "Emyvale" in my data). These may be the same cell site.

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iii) 15:13:02 "Cavanagarvan" (as opposed to "Stranooden" in my data). I understand that Cavanagarvan is within Stranooden. These may be the same cell site.

The cell usage of the incoming calls for phone 980 are not commented upon in the summary and conclusions section of Mr Weeks' report (section 101, page 30 of INQ012964). I do not know why there is an apparent discrepancy between the cell usage we have considered, but in my view it does not affect summary and conclusions drawn by Mr Weeks.

7.4. **087[PD]5585**; There were two incoming calls in the data that I have found for this phone on 15th August for which I have cell site data for the calling phone.

7.4.1. There were no "inter-network" incoming calls, all were "Eircell" to "Eircell". The cell listed for both the calling and called phone was the same in the data that I have received. I do not know if the incoming call Cell IDs are definitely "other party" call data but it is possible that they may be:

- i) 087[PD]3980 called 087[PD]5585 at 16:00:50. The Cell ID listed for both 087[PD]5585 and 087[PD]3980 was 27201000C6598, based at Castleblaney.
- ii) 087[PD]3980 called 087[PD]5585 at 16:01:44. The Cell ID listed for both 087[PD]5585 and 087[PD]3980 was 27201000C5218, based at Tallanstown (Acclint Bridge).

7.4.2. The calls are illustrated in a table on page 3 of my exhibit "1026731/MST/2/270526" (INQ042462). The data that I used to generate this table for phone 087[PD]5585 is listed on page 82 of INQ001617. The data that I used to generate this table for phone 087[PD]3980 is listed on page 5 of INQ001617. The table is a fair reflection of this data.

7.4.3. Analysis by Mr Weeks

Incoming cellsites for 585 are listed in a table on page 18 of 5441/GP1 (INQ012963). Cell IDs are not listed, and the cell names differ from those that I have found in the data I have received. The cellsites listed by Mr Weeks are:

- i) 16:00:50; "Clermont Carn" (as opposed to "Castleblaney" in my data). "Clermont Carn" and "Castleblaney" are different cell sites.
- ii) 16:01:44; "Mohercrom" (as opposed to "Tallanstown (Acclint Bridge)" in my data). "Mohercrom" and "Tallanstown (Acclint Bridge)" are different cell sites.

The cell usage of the incoming calls for phone 585 is commented upon in the summary and conclusions section of Mr Weeks' report (section 101, page 30 of INQ012964). Both phones are described as having been in an area between Castleblaney and Tallanstown at

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approximately 16:00 hours. I do not know why there is an apparent discrepancy between the cell usage we have considered. There is an additional observation provided by Mr Weeks which I am unable to replicate from the data submitted to me.

7.5. **087[PD]9971**; There were five incoming calls in the data that I have found for this phone on 15th August. There were no "inter-network" incoming calls and the calling phones were not amongst those considered; I am not aware if I have data for them.

7.5.1. All calls between 12:40 (the beginning of the period I have been asked to consider) and 17:35 (after the end of the period I have been asked to consider) were outgoing calls and I trust the cells used.

7.5.2. Mr Weeks does not make comment on this phone in his conclusion (section 101, page 30 of INQ012964).

7.5.3. I make no comment on the incoming calls in my report, but the table on page 10 of my exhibit contains an oversight in which I state that I trust all listed cells; in my opinion I trust the cells listed for outgoing calls, and do not know if I can trust those for incoming. I apologise for this error which does not affect the commentary or conclusions presented in my report ("1026731/MST/1/270526/Cell Site Analysis", INQ042459).

7.6. **087[PD]6456**; All calls that I found in the data on 15/08/1998 were outgoing. I trust the cells listed for these events.

7.7. **087[PD]4259**; All calls that I found in the data on 15/08/1998 were incoming. There was an incoming call in the data that I have found for this phone on 15th August for which I have cell site data for the calling phone.

7.7.1. The call was "Eircell" to "Eircell". The cell listed for both the calling and called phone was the same in the data that I have received. I do not know if the incoming call Cell ID is definitely "other party" call data but it is possible that it may be:

i) 087[PD]3980 called 087[PD]4259 at 17:30:52. The Cell ID listed for both 087[PD]4259 and 087[PD]3980 was 27201000C0374, based at Dundalk.

7.7.2. The data that I considered for phone 087[PD]4259 is listed on page 250 of INQ001616. The data that I considered for phone 087[PD]3980 is listed on page 46 of INQ001616.

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7.7.3. Inter-network calls

There was contact with two phones not associated with the Eircell GSM network. Both had the prefix "088", which I believe indicates that they were using the Eircell TACS (analogue) network. The calling phones were not amongst those considered; as they were on TACS, I do not believe I have data records for them. There were two calls:

- i) 15:18:29, with the listed cell "DXK2V1" (unknown location)
- ii) 19:29:14, with the listed cell "SHMV1" (unknown location)

7.7.4. The format of other Cell IDs within the data involving phones associated with the Eircell GSM network are of a different format to that for these call events. For example the Cell 27201000C0374, based at Dundalk and discussed above, is in a format known as a "Cell Global Identity". This example is presented in hexadecimal (rather than decimal, which I also routinely encounter). This is a unique number for the specific cell (i.e. no other GSM cell in the world should share that number). For this specific Cell:

- i) The first three digits, "272", is the Mobile Country Code (MCC).
 - MCC 272 corresponds to Ireland
- ii) The next two digits, "01", is the Mobile Network Code (MNC)
 - MNC 01 corresponds to Vodafone Ireland (historically Eircell/Vodafone)
- iii) The next four characters, "000C", are the Location Area Code (LAC)
- iv) The remaining four characters, "0374", are the Cell Identity, and used as short hand for the cell in my report and exhibits.

The cells for the calls received by phones with the prefix "088" are not in this format. The values "DXK2V1" and "SHMV1" are neither in decimal nor hexadecimal. I am not familiar with TACS Cell ID formatting, but I have never seen this format of Cell ID before in my research or casework, for 2G, 3G, 4G or 5G cells. One possible explanation for the data, and one I am inclined to believe but do not know to be true, is that the listed cell is an artefact from TACS (possibly a site reference, but I do not know).

7.7.5. Analysis by Mr Weeks

The incoming cellsite for 259 is listed in a table on page 18 of 5441/GP1 (INQ012963). Cell ID 374 "Dundalk" is listed for both phones. The calls from prefix "088" were not resolved to cellsites, and are not commented on. The cell usage of the incoming calls for phone 259 is not commented upon in the summary and conclusions section of Mr Weeks' report (section 101, page 30 of INQ012964).

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8. Summary and Conclusions

- 8.1. I do not know whether the incoming call data that I have considered for phones on the Eircell GSM network definitely contains "Other Party" cell data. There are indications that I would expect if they do include "Other Party" cell data; my tests are, however, not definitive. If "Other Party" cell data for incoming calls is included, such data would be unreliable.
- 8.2. I made no comment on cell usage for "incoming" calls in "1026731/MST/1/270526/Cell Site Analysis" (INQ042459) as I feared the cell data may be unreliable. My opinions and commentary in that document therefore remain unchanged as a result of the additional analysis in this report.
- 8.3. Mr Weeks may have been in receipt of additional "incoming" call data as different cell sites are listed for some incoming call events than I have found. The effect of this additional data is limited to only one observation in the conclusions section of Mr Weeks' report (section 101, page 30 of INQ012964).
- 8.4. The issues discussed in this report do not affect outgoing calls, which form the vast majority of calls considered.

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9. Additional Notes of Clarification

9.1. My review of the cellsite reports was primarily through the lens of process. In particular and as defined in section 9 of my "principles" report, I focussed on:

9.1.1. The general process used.

9.1.2. Presence / use of survey data, and the manner in which such data informed opinion.

9.1.3. Core limitations (e.g. large cell service areas).

9.1.4. Obvious "Other Party" call data had been included.

9.1.5. Whether Azimuths were available in the call data considered by others.

9.1.6. Obviously missing call data between my own analysis and that considered by others.

9.1.7. The format (rather than content) of conclusions; specifically if there were overt statements that a given proposition were true (i.e. transposed conditionals).

The review of the cell site analysis reports was therefore a general overview of process.

9.2. I performed my own analysis as a separate exercise and, to avoid potential context bias, I did so without detailed review of the detail of the findings from other experts. I checked for "absence" of data within their reports, but did not check if data I subsequently received was different. In short, I did not do a full technical check of the received cell site reports before my analysis or after conducting it.

9.3. The data used by Mr Weeks is listed in paragraph 14 of his report (page 6 of INQ012963). It includes some files that I instantly recognised, for example the Praesidium reports that I review in some detail in my report "1026731/MST1/270526/Cell Site Analysis Principles" (INQ042460). Other data listed includes, for example "R v Seamus Daly - File 6 - Telephone Evidence (3 x Folders)". It is possible that Mr Weeks was in receipt of data that I do not have, or did not find in my review of the received material.

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10. General Comments

- 10.1. My findings are based on the information currently available to me. Unless otherwise stated, I assume there have been no significant changes or faults that would have affected the data. If this information were to change then a new analysis of the data may be required, and I would consider for example changes to:
- 10.1.1. The reliability of the call data received.
 - 10.1.2. The network configuration in the area of my survey between the times of the call events considered and that of the surveys (if used).
- 10.2. Where I have used the phrase "the data is of a type I would expect" given the proposed scenario, there may be a number of alternative possible explanations for these findings. The stated proposition is that considered. I do not have a stated testable alternative proposition. I have therefore assessed whether there is data in conflict with that expected given the proposition under test (i.e. I have attempted to disprove the proposition). As an indication to the level of discrimination possible within my analysis, unless otherwise stated for a specific cell, a general expectation is that the distance a cellsite might be from a given location can vary from around:
- 10.2.1. Dense/Urban area - currently typically up to approximately 1km. In 1998, estimated up to 5km.
 - 10.2.2. Suburban area - currently typically less than 3km. In 1998, estimated potentially over 7km.
 - 10.2.3. Rural area - currently sometimes more than 10km. In 1998, estimated as above 20km and potentially up to 35km.
- 10.3. My ability to detect data that is not of a type to be expected (i.e. is in conflict) with propositions is limited by these expectations. It is feasible that the findings could be more, less, or equally probable if a proposition other than that tested were true, but in the absence of any such proposition, I am not able to evaluate the evidential strength of my findings. If a testable alternative proposition becomes available, I am prepared to consider it. Any reappraisal is more effective if carried out in advance of any trial and may not be possible in a court environment due to the quantity and type of data involved.
- 10.4. The electronic data have been retained in the raw format produced by the equipment used. The data have not been directly presented but are used to produce maps and tables; this data is available for further examination if required. A record of the work undertaken is contained in case notes and these are available for examination, if necessary, at the laboratory.

Report produced by: Dr Matthew Tart

Opinion checked by: Dr Iain Brodie

END OF REPORT