



IPL at work

IPL's innovative communications data visualisation tool helps Kent Police keep the public safe

With budget cuts biting across the public sector, the UK's police forces are faced with a significant challenge: keep a growing population safe, but at an ever-lower cost. These constraints mean that forces across the country are having to find new, innovative and intelligent ways to fight crime.

The cornerstone of these initiatives is technology, which provides opportunities to monitor, detect, investigate and solve crimes in new ways, thereby enabling the police to stay one step ahead of criminals. One technique has been to use communications data, such as Call Detail Records (CDRs).

CDRs contain information about who someone has been in contact with, and where they were when each communication took place. This data, particularly the location details, can be extremely valuable to the police for a number of reasons, perhaps most importantly because it can provide a quick way of ruling a suspect in or out of an investigation. However, while this CDR information has long been available to the police to help them in their investigations, it is difficult to exploit it to its full potential. This is because of the complexity of the data means it can be costly and time-consuming to analyse.

As part of its drive to remain at the cutting edge of policing, Kent Police ran a three-month pilot of IP Insight, IPL's CDR analysis tool. IP Insight can rapidly visualise raw CDR data in a variety of ways, thereby providing investigating officers with valuable intelligence within seconds – where existing techniques could take days.

The wide-ranging benefits to crime-fighting were evident during the pilot, including the prevention of an armed robbery.

The current problems

When a police Investigator requires the CDRs of someone they are investigating, they can request these, via their force's Single Point of Contact (SPoC) team, from the communications service providers (CSPs), such as O2 or Vodafone.

Interpretation difficulties

These CDRs typically come back to the police as complex tables of text-based data, containing numerous codes representing the location of masts and the like. The varied nature of the CSPs' internal systems means that each provides the data in a slightly different format. So while simple queries can be answered relatively quickly using a text search (did Mr A phone Mr B's number on a given day?, for example), the time involved in answering more complex queries, particularly around geographical locations (was Mrs A in location B at time C?), mean the raw CDR data is of little use to a busy investigator, and requires interpretive input from either the SPoC, or an Analyst.

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High analysis cost

Police forces all have analysts, whose job it is to cleanse, visualise, analyse, interpret and report on call detail records, using sophisticated tools. However, these are highly skilled individuals whose involvement can currently only be justified financially on serious crimes. This means that CDRs are not taken advantage of fully when it comes to volume crime because there simply isn't the budget to pay for the analysts' time. Furthermore, the tools that analysts use, while extremely powerful, require significant manual cleansing of the input data before it can be used – not to mention training in their use. This puts them out of reach of a busy Investigator.

Diminishing local knowledge

As a result of their shrinking budgets, many forces across the country are merging their communications data teams to make more efficient use of these scarce resources. Under the old, essentially county-based setup, each force's team would build up detailed geographical knowledge of their area and the communications cells within it. This would mean that a SPoC in Suffolk would know that a cell ID sequence of x, y, z meant someone was travelling down the A14 to Felixstowe. A SPoC originally from Norfolk, on the other hand, now working across the whole of East Anglia, may not know this, and would have to look it up, thereby slowing down the process.

The cost-effective solution

To overcome these difficulties and make better use of the CDRs to fight crime, Kent Police worked with IPL to pilot a new CDR visualisation tool called IP Insight. Developed by IPL to meet the evolving needs of police forces across the UK, IP Insight rapidly visualises CDRs, without the need for that data to be manipulated in any way before it can be used. IP Insight is able to ingest CDRs from the major CSPs and visualise them in an instant.

Intuitive visualisations

By providing Kent Police with a range of rapid visualisations, IP Insight brought benefits to SPoCs, Investigators and Analysts alike. These visualisations include:

- **Maps:** Zoomable, interactive maps of an individual's communications activity over time
- **Timeline:** View historical data in a visual timeline, rather than as a spreadsheet
- **Time-lapse:** IP Insight can play the visualisation of CDR data on the map over time, showing an individual's movement
- **Top 10 contacts:** A quick overview of someone's top 10 most contacted numbers, which can be filtered to show solely communications with any one of the contacts
- **Sleep locations:** By monitoring an individual's communications patterns, IP Insight can detect their usual sleep locations, pointing police to their place of residence

Better ways of working

As a result of the features that IP Insight provides, the key stakeholders within Kent Police were able to work more efficiently on their investigations.

The SPoCs

The SPoC remained an important player in the CDR analysis process. However, because IP Insight took over some of the high-level analysis that the SPoCs had previously carried out, this freed them up to process more call detail requests from Investigators.

Furthermore, by visualising the geographical data, the issue of diminishing local knowledge among SPoCs ceased to exist. No prior understanding of an area is needed to interpret patterns of movement between communications cells, because these are clearly visible on a map.

The investigators

At the heart of each investigation, the Investigators saw a number of benefits. Firstly, they were able to get maps of call data instantly, where existing mapping techniques can take days to deliver results. Having fast access to the mapping and other non-simple data meant they were able to target other investigative techniques accordingly, and analyse data even when no SPoCs were available, or there was no budget for Analysts.

IP Insight also made CDRs a viable line of investigation for crimes that would otherwise not have justified its use, notably so-called volume crime. This led to increased use of CDRs and ensured that the responses from the CSPs were fully exploited.

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Outcomes

During its three-month pilot, IP Insight was used in a variety of cases and brought significant benefits to Kent Police. In the case described here, the benefits of IP Insight to the investigation were:

- Rapid mapping of communications data meant suspects could be qualified in at an early stage of the investigation
- The geographical and timeline views of communication data enabled staff to recognise that the suspects had been in the vicinity of both crimes
- Having a common online view of the data enabled a discussion between the SPoC and Investigating Officer, even when they were not in the same place
- The top-10 contacts list enabled easy filtering of data to view solely communications between the suspects
- The sleep-location view assisted identification of the suspects' home addresses



Improved collaboration

Because IP Insight is a secure web-based system, geographically dispersed teams can use it to collaborate on investigations, whether they are at home, in an office or in the field – using a range of devices.

A representative of Kent Police's SPoC, explained the all-round benefits the tool delivered, as well as the potential advantages it would offer when used more widely, stating: "IP Insight vastly reduced the time required both to plot call data on a map and to circulate this to our investigators. It's a perfect example of how technology can enable us to protect the public better and work smarter across the force. Indeed, we envisage that if IP Insight was to be rolled out across the entire force, there would be further benefits. Our analysts, for example, would be able to make use of it as a quick way to assess incoming data, before deciding whether to commit time to analysing it further with their more sophisticated tools."

A real-life scenario

To understand the tangible benefit that IP Insight delivered to Kent Police and the public, the following is the story of a real-life case. Kent Police was investigating a series of armed robberies involving crimes in a number of coastal towns across Kent and Sussex. The investigator had identified two suspects they believed were involved. To rule them in or out of the investigation, the team decided to use communications data to try to link the suspects to the time and location of the crimes. On a Friday afternoon, the SPoC unit was asked to acquire the relevant communications data.

The responses came back once the SPoC leading the analysis had gone home. But with IP Insight, they were able to log in remotely and view the response visualisation.

The results quickly showed that the data was relevant to the investigation, so the SPoC shared the visualisation with the investigator, and explained their interpretation of it. The visualisation placed both suspects in the vicinity of the crimes and confirmed they were communicating with each other at the relevant times.

This intelligence that IP Insight provided justified the use of additional resources to build a case against the suspects. IP Insight aided the process further by helping determine the suspects' home addresses, using the sleep location data. This showed they were both likely to be found in an area of south London during an early morning lull in communications.

Once sufficient evidence had been gathered, the suspects were arrested, and found to be in the process of planning a further armed robbery. The spokesperson for Kent Police added: "The intelligence provided by IP Insight enabled Kent Police to prevent a third armed robbery from taking place, thereby preventing harm to the public and the cost of a potential armed response, subsequent investigation and trial.

"Furthermore, because we were able to intervene in and solve this case more quickly than we would otherwise have been able to, we freed up valuable staff time, which was then committed to other investigations."

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