Criminal networks: A network analysis of co-offending and co-communication

- A quantitative case study

Alma Björk and Moa Björk

2022

Student thesis, Bachelor degree, 15 HE
Criminology
Study Programme in Applied Criminology
Thesis in bachelor’s degree in criminology

Supervisor: Jerzy Samecki
Examiner: Amir Rostami
Abstract

The thesis was aimed to investigate the structure of a criminal network and how the EncroChat-communication- and co-offending-structure differs. To study this, a network analytical method was applied that resulted in four networks: co-offending according to the verdict, co-offending according to the prosecution, Encrochat-communication and a network where these three networks were merged. The results showed that the co-offending networks obtained a more compact composition than the EncroChat-communication network. All networks had a dense core containing the most central actors, although some exceptions existed in the co-offending networks. The results of the network analysis indicated that the actors who committed the most crimes also communicated the most. The results also showed a partly different composition of other prominent actors in the network analysis than what the prosecutor presented. Therefore, network analysis can be used as an extra dimension in law enforcement work due to its function in identifying structures.

Key words: EncroChat, Criminal networks, Co-offending, Network analysis
Chapter 1

1.1 Introduction

Criminal policy is in today’s society a frequently discussed topic and in the criminal policy debate, organised crime is considered a major societal problem (Brottsförebyggande rådet (BRÅ), 2007, p.125). In the last 30 years the phenomena of criminal gangs have increased at a high rate (Rostami, 2017, p.365). To decrease the criminal networks, coercive measures have been used, amendments to the law have been approved and new crime prevention methods against the criminal networks have been introduced (BRÅ, 2007, p.125). Although criminal gangs are described as a major societal problem, there is limited research on the criminal gangs’ organisational structures and the division of responsibilities between actors (Rostami, 2017, p.367). Therefore, new research is needed to develop knowledge about these criminal gangs. It is therefore of great criminological relevance to study criminal networks in order to create a greater understanding of how these networks are structured and function.

Ever since Thrasher studied gangs in 1927, the gang phenomenon has had a major focus in criminological research. However, what we can tell, much of the research that has been conducted on criminal gangs has focused on co-offending. This has led to the knowledge of criminal gangs for a long time being limited to co-offending. This changed when the French authorities got past the encryption technology of the encrypted communication service EncroChat (Polisen, 2021, p.5). This meant that the authorities had access to the user’s correspondence and information. The information opened up an opportunity to gain greater knowledge and insight about the construction of the criminal gangs, one could now see how the individuals communicated and about what. What can be established through a literature review is that the use of this type of material has been lacking in the research conducted on criminal gangs. Therefore, this essay aims through the EncroChat material to contribute with additional knowledge about the construction of criminal gangs.
1.2 Aim and research questions
The purpose of this essay is to carry out a descriptive case study of the structure of a criminal network based on co-offending and communication. This will be conducted through a network analysis where four different analyses will be carried out. The analyses will consist of a communication network (EncroChat-communication), two different co-offending networks (joint participation in crime according to the prosecutor and the verdict) and a network where these three networks are merged. These networks will then be compared to study the structure of the network in more detail.

Research questions:
- How does the structure of the criminal network differ if the network analyses are based on data from the verdict, the prosecution's claim and the EncroChat-communication?
- Can the hierarchical roles assigned to actors by the prosecutor be found in the structure of the networks?

1.3 Explanation of Concepts

1.3.1 EncroChat
One of the materials we based our essay on is EncroChat-communication. We therefore named and referred to this concept frequently during the essay, which entails a need to explain and clarify what this concept means. The operation that led to these types of prosecution began with the authorities being made aware that modified telephones had been equipped with dual operating systems with encrypted applications for communication (Polisen, 2021, p.5). One of these operating systems was EncroChat which enabled anonymous and encrypted communication between individuals under aliases. According to Europol, the service offered by EncroChat has been used extensively for criminal purposes (referenced in Polisen, 2021, p.5). Therefore, the French authorities decided to get past the encryption technology in collaboration with other countries. This meant that the authorities had access to the user's correspondence and information. This information has since been shared with a number of countries, of which Sweden has since been able to follow the chats in real time (Polisen, 2021, p.5).
1.3.2 Co-offending
A concept that has been central in this essay is co-offending. In this essay, we referred to Sarnecki’s (2001, p.21) definition that co-offending means joint participation in crime. A key factor that Sarnecki (2001, p.22) mentions is that co-offending affects an individual's criminal activity. The individual can either make a rational choice about the choice of accomplice or the crime can be influenced by which people happen to be present at the time the crime is committed (Sarnecki, 2001, p.23). In our essay, we did not place any significance in the characteristics of co-offending, but only named whether co-offending occurs or not. In this essay, we referred to joint participation in crime in the use of the term co-offending.

1.3.3 Gangs
The definition of what a gang is and what characterises these are many and differ greatly from each other. Therefore, we believe that it is important to discuss this and clarify the definition on which this essay is based. Miller (1980, p.20) believes that gangs have an identifiable leadership with organisational features such as well-developed authority roles that act in concert to achieve purposes that often include illegal activities or control over certain areas. Identifiable in Miller's (1980, p.21) definition is that the gangs are well organised.

1.4 Disposition
This essay is divided into seven different chapters. The first chapter deals with the introduction, purpose, issues and explanation of concepts. Chapter two deals with a literature review of relevant previous research. Chapter three concerns theoretical framework. Chapter four deals with methodological points, as well as a discussion of validity, reliability, generalisability and ethics. In chapter five, the results that have emerged are presented and analysed. These results are then compared and discussed in chapter six. In chapter seven the conclusion of the essay is presented.
Chapter 2

2.1 Literature review

Below is a literature review on the topics that we considered to be most relevant to our essay. During our search for literature, we have considered the relevance of the study and in this way tried to delimit the search. We searched for the term "gäng" and “gang” in the university in Gävle's library portal discovery and google scholar, which did not give us any relevant results. Therefore, we searched for the term “gäng” on BRÅ's website where we found the article “kriminella nätverk och grupperingar” from 2016. We also searched for the term “social network analysis” at the University of Gävle's library portal discovery, where we found Sarnecki's study “delinquent networks: Youth co-offending in Stockholm”. The term "criminal network" did not yield any relevant literature when we searched for this in the university in Gävle's library portal and google scholar. We searched for “Social network analysis” in google scholar which gave us the results of Rostami and Mondani (2017) and De Moor et.al. (2018). We have also gone through course literature from previous courses to find relevant literature.

2.1.1 Research on gangs

Thrasher (1927) is considered to be the first to study gangs. Although the book was written almost 100 years ago, it is relevant today. As Sarnecki (2020, p.62) writes, Thrasher's (1927) work is significant even today as it helps us to understand society better. Gang formations are characterised by constant change where most groups are not lasting (Thrasher, 2020, p.101). Essential for many gangs is that they are characterised by instability where conflict or changes within the group threaten the gangs' existence (Thrasher, 2020, p.102) Thrasher (2020, p.290) concluded that gangs were often made up of a small, compact group. Around this group, smaller groups are created by individuals who, among other things, serve to protect the central core. The gang is built around the leader and changes in connection with the leader changing. Thrasher (2020, p. 357) saw that some gangs were characterised by crime that was organised and continuous. Thrasher (2020, p. 358) believes that these gangs are characterised by what are referred to as "floating characters". This means a form of organisation that lacks a lasting structure and leadership. The gang are thus changeable and soluble. The gangs have a clear division of labour with individuals with special knowledge (Thrasher, 2020, p.359).
More recent research on gangs is BRÅ’s (2016) report on criminal networks and groups. The study aimed to develop a new conceptual framework for organised crime (BRÅ, 2016, p.25). The conceptual apparatus is intended to be used to categorise different types of criminal phenomena and groups. To produce this, about 60 interviews with police employees have been conducted and about 60 intelligence reports have been examined (BRÅ, 2016, p.24). The result of the report was as follows: they refer to one type of grouping as “self-defined groups” (BRÅ, 2016, p.13). This group is characterised by members being self-centred with their own agenda, often with drug and alcohol abuse. The gangs have a hierarchy and rules that members are expected to follow where violations are punished with exclusion and possible lethal violence. The second group is referred to as “Suburban and district-based groups” (BRÅ, 2016, p.13). This group differs from the "self-defined groups" in that they are not as organised. BRÅ (2016, p.13) believes that the structure of these types of groups is built around some governing individuals. This group also has collective and punishment rules, but which are formulated by the leaders when necessary. The group is often soluble and changeable. As the members are often disloyal and do not want to submit to anyone else for a long time, it often leads to conflicts, power struggles and frictions within the group.

2.1.2 Criminological research with network analysis as method

In the study *Delinquent networks: youth co-offending in Stockholm*, Sarnecki (2001) used network analysis as a method for studying relationships between individuals in a criminal youth gang. The purpose of the study was to study the structure of how individuals commit crimes with each other and how the formation of juvenile delinquency networks in a metropolitan area (Sarnecki, 2001, p.29). The hope was that understanding of juvenile delinquency would be improved by studying the relationship between the criminally active youths. The results of the study show that adolescents tend to commit crimes with individuals from the same area and of the same gender as themselves (Sarnecki, 2001, p.164). The study also showed that the networks consist of loosely composed groups that are often changeable and do not hold the same structure and constellations for a long time even if the same individuals are found in the networks (Sarnecki, 2001, p.162).
Another example of criminological research using network analysis as a method is Rostami's and Mondani's study “Organizing on two wheels: uncovering the organizational patterns of Hells Angels MC in Sweden” from 2017. The purpose of this study was to study Hells Angels circle in Sweden (Rostami & Mondani, 2017, p.39). This was done by comparing the Hells Angels members with the members of its sub-organizations, Red & White Crew and Red Devils MC in a network analysis. The material for this was based on gang membership data obtained from the police and data based on co-offending from the Swedish National Council for Crime Prevention. The results showed that the different organisations differ in the structures (Rostami & Mondani, 2017, p.34). For example, it could be discerned that the Hells Angels network was significantly more interconnected than the other two with clusters where each individual is connected to the other (Rostami & Modani, 2017, p.42). Red & White Crew consisted of a few larger circuits and were less interconnected while Red Devils MC consisted of many small, isolated assemblies. Red & White Crew also had structures that were more reminiscent of a street gang than Hells Angels, while Red Devils MC had a less centrally controlled and chapter-based pattern of criminal cooperation than Hells Angels MC (Rostami & Modani, 2017, p.34).

Another previous research with social network analysis as a method is De Moor, VandeViver and Vander Bekens (2018) study "Integrating police-recorded crime data and DNA data to study serial co-offending behaviour". In this study, the network analytical method has been used to investigate co-offending based on police-registered crime data and DNA data to study co-offending behaviour (De Moor et.al, 2018, page reference is missing). The authors focused on studying what changes could be identified in the networks when data from police-recorded crime data integrates with data from a DNA database. The results of the study showed that a network analysis with integrated data from both police-recorded crime data and DNA registers gave a greater spread in the network compared to only police-recorded crime data.

2.2 Problematization of the literature

An observation in the literature review is that there exists a knowledge gap with literature that is based on network analysis of communication between actors. We have observed that almost all previous research with network analysis as an approach is based on co-offending (e.g., Sarnecki, 2001; Rostami & Mondani, 2017; De Moor et.al., 2018). This
makes it difficult to draw comparisons with the results of communication structures. Comparisons and connections will nevertheless be drawn between the results of this essay and the previous research to the extent that its possible, even though certain material differences exist. It is also possible to be critical of the literature. Almost all of the previous research has used police data. BRÅ (2007, p.14) means that police data is secondary data that can be coloured by different biases and selection processes. Thus, they cannot give an absolute picture of the problems they describe. This may affect the suitability of the previous research in relation to this study. However, comparisons with previous research can still provide rewarding analyses and comparisons. Although its pitfalls should be considered.
3.1 Theoretical framework

The theoretical perspective we have used in this essay is differential associations of Sutherland (1934). Marsden and Friedkin (1994, cited in Sarnecki, 2001, p.5) wrote that one of the most important tasks of social network analysis is to describe relationships between, for example, individuals and how their interactions with each other affect each other's behaviour. Therefore, Sutherland's (1934) theory of differential associations is relevant to this essay. This is because the theory means that criminal behaviours are learned through interaction with others (Sutherland, Cressey, & Luckenbill, 1992, p.88-89). This can thus be considered as a theoretical framework in our essay. Sutherland et al. (1992, p.88-89) states in his theory of differential associations that there are nine theses that describe the process that causes an individual to commit crime:

1. Criminal behaviour is learned.
2. Learning criminal behaviour takes place through a communication process with other individuals.
3. The learning takes place in close groups between the members.
4. The learning that takes place includes techniques for committing crime as well as motives and attitudes to crime.
5. The learning also includes motives and attitudes towards the law that are shared within the group.
6. Individuals commit crimes when the attitudes that support pro-criminal behaviour become stronger than the attitudes that support anti-criminal behaviour.
7. The individual's connection to procriminal or anti-criminal individuals may vary.
8. Learning criminal behaviour works in the same way, through the same mechanisms, as other types of learning.
9. Criminal behaviour cannot be explained by general needs and values as conformist behaviours can also be explained by the same general needs and values as the criminals. For example, theft cannot be explained by the need for money, as even conformist behaviours such as work can also be explained by money.
In this essay, the structures and composition of a criminal network are studied by examining co-offending and communication. Therefore, we believe that this theory is appropriate to apply to this work. Sutherland et al. (1992, p.88-89) believes that criminal behaviour is learned through a communication process. Our material consists of the members' correspondence between each other in the criminal network, the prosecution and verdicts based on this communication material. This can thus be compared to what Sutherland et al. (1992, p. 88-89) believes is the learning process of criminal behaviour through communication. The third thesis Sutherland et al. (1992, p.89) mentions is that learning takes place in close groups between members. This can also be compared to our essay where the members of the criminal network we are to investigate probably have close relationships with each other. We use the term probably as we cannot say with certainty that the individuals have a close relationship.

3.2 Application of theory
The theory means that interaction between individuals leads to crime (Sutherland, 1992, p.88-89). However, the theory does not say that interaction leads to co-offending. This speaks against the use of the theory in this essay, but since the theory is based on group learning, we considered it to be applicable to our essay. The theory means that learning takes place through group interaction (Sutherland, 1992, pp.88-89). This essay aims to study what the structure of a criminal network looks like based on the members' co-offending and communication, which enables an appropriate theoretical framework for the essay. However, the quantitative framework of the essay has led to difficulties in applying and commenting on the theory of the essay’s result. The result could only see what the EncroChat-communication and co-offending structure looked like within a criminal network and not how the learning or the process of the crimes took place. Therefore, the theory has been applied through assumptions and interpretations and can thus not be seen as facts. The application of the theory in this essay has led to a relevant discussion about its benefits on further research in the field, which we have discussed in the section discussion.
Chapter 4

4.1 Data and methodology

In this section, we will go through the method and material of the study. We will discuss the limitations of the material and the delimitation we have chosen.

4.1.1 Choice of method

To study the network's structure, complicity and communication, a network analytical method has been used. By structure, we mean those who commit crimes with whom and those who communicate with whom within the network. In this essay, we analysed four different networks based on three different materials: EncroChat-communication, prosecution, sentence and a compiled network of these three materials. We chose to carry out the essay as a case study where the structure of a criminal network has been analysed with the help of network analysis. We chose network analysis as a method because it is best suited to answer our research questions. Roxell (2006, p.195) means that network analysis is a method for studying relationships between individuals. The pattern of relationships is what constitutes the network itself and is thus what is to be analysed (Roxell, 2006, p.195). This means that the method is very relevant for our essay, which aims to study the composition of the criminal network based on relationships of complicity and EncroChat-communication. The network analysis has been carried out in the Gephi program. Roxell (2006, p.197) emphasises that network analyses can be studied in different ways. Our choice of method is based on what Roxell (2006, p.197) emphasises as sociocentric. This type of network analysis is based on studying all the people in the population for a certain period of time.

4.1.2 Network analytics concepts

Below, some network analytical concepts will be explained. Borgatti, Everett and Johnson (2018, p.2) means that the entities that make up a network are called actors. In this essay, actors have consisted of the individuals designated as members of the network. The actors have been pseudonymised to different numbers and have been kept constant through all network analyses. For example, actor 1 was actor 1 in the two co-offending networks (the verdict and prosecution) and in the EncroChat-communication network.
The concept of *link* in network analysis consists of relations between actors (Borgatti et al., 2018, p.2). In this essay, the links consist of joint participation in crime and correspondence. These links can be *direct* or *indirect* (Roxell, 2006, p.196). A *direct link* means that the relationship between the actors is direct, that the actors commit crimes together or communicate with each other. The relationship thus goes from one actor to another. An *indirect link* means that actors are connected to each other without having a direct contact (Roxell, 2006, p.196). Two actors can have indirect contact by possessing links to the same actor without possessing direct links with each other. The term *eigenvector centrality* is used in the essay. This term describes actors' degree of centrality which means that an actor has a central role in the network by having many links to other actors who themselves have high scores (Borgatti et al., 2018, p.194). This is shown, for example, if two actors have committed crimes together more than once. The weight of the link is shown by the thickness of the link in the network analysis. In other words, the link is thicker the more times the same individuals have committed crimes together or communicated with each other. When this occurs, we have called the link strong and if this does not occur, we refer to the link as weak.

4.1.3 Data collection

The data we have chosen to use is a verdict and preliminary investigation where a criminal network has been convicted of crimes with evidence of, among other things, EncroChat. This means that the data collection has taken place through a secondary nature. Borgatti et al. (2018, p.34) states that this is data that already exists. Thus, nothing has been created for the purpose of this essay. We did a search on the relevant district court for verdicts and chose one we considered relevant to our essay. Our delimitation was a verdict based on evidence from EncroChat as these types of verdicts make the structure and correspondence of the network visible in a clear way, which we believe was essential to answer our research questions. The verdict material and the preliminary investigation are accessible for those who want it.

The materials that have given rise to the two co-offending networks consist of the descriptions that the prosecutor and the district court have given regarding the guilt. This material thus consists of two different parts that will give rise to two different analyses. Our third analysis consists of EncroChat-communications. Thus, this material consists of
the EncroChat messages available in the preliminary investigation material. The verdict-material consists of 30 actors, the prosecutor material consists of 33 actors and the communication-material consists of 54 actors.

4.1.4 Delimitation
In our conversation material, we chose to code each conversation between the actors separately and not each individual message separately. These conversations are what form the links between the actors in the EncroChat analysis. Thus, the relationships between the actors in this analysis has been based on conversations. We describe in more detail why we chose to code the material below under the section Research approach. This meant that we needed to make a distinction between where one conversation ended and where another began. When we delimited messages into conversations, we read the messages and made a subjective assessment of when a conversation started and ended. We coded conversations separately and then compared to see if we both coded in the same way. This was to reduce the risk of incorrect coding. This can be compared to the coding in qualitative content analysis where the coding of the material is done separately by different researchers to reduce incorrect coding due to subjective assessments (Schreiers, 2012, p.12). However, this may affect the reliability, which we will discuss in more detail below.

4.1.5 Limitations of the material
One limitation with the use of the verdict- and preliminary investigation material is that it is limited to a certain time and context. Sarnecki (2001, p.35) claims that the time the analysis continues affects the results of network analyses. The reason for this is that the more time that is included in the analysis, the more of the phenomena to be analysed have time to be detected. Otherwise, the case may be that the analysis shows that some individuals only committed crimes alone because their complicity in the crime was not perceived by the analysis. This is a limitation in our material as the data we have selected is limited to a verdict and preliminary investigation and thus to a limited time and proportion of crimes. Links and actors can thus be further connected over time, which our essay does not have the capacity or time to handle. Furthermore, this could have been handled with a triangulation in the form of register data of the criminal records to study a
longer period of time. Another limitation with the material is that all information is based
on the verdict and preliminary investigation material. The disadvantage of this, according
to BRÅ (2007, p.14), is that verdict and preliminary investigation material cannot give a
complete picture as it is the result of a selection process. The risk that we used this
material is thus that we risk repeating the blind spots of the judiciary and thereby risk
losing essential information.

4.2 Research approach

We encoded the material in excel which we then reformatted to a csv file to be able to
import it into the program Gephi where we performed the network analyses. We
conducted four different codings for the analysis we intended to carry out: the verdict,
prosecutor and EncroChat-communication material, as well as a merger of the three
networks. Thereafter, the network analyses were performed separately to obtain a
depiction of the different network structures. In the analysis, runs were carried out where
structures, centrality, roles, sentence length and the most central actor's contacts were
analysed. In the preliminary investigation, the prosecutor has given roles to individuals
within the network. The individuals in the network are designated as leaders, site
managers, captains, captains in the field and soldiers, written in hierarchical order. With
this, the prosecutor highlights the hierarchy within the network and which actors hold
significant roles. This division of roles has also been implemented in the analysis to
examine how the roles relate to the results that emerge from the analyses. We also
implemented how many months each actor was sentenced to in order to further create a
nuanced analysis of the verdict network. The length of the sentence ranged from almost
11 years to 1 month. We have chosen to only apply this attribute to the verdict network
as this network is the only network where all actors were convicted of the crimes they
were prosecuted for.

We chose to code the relationships in the EncroChat-communication material in the
proportion of conversations between the actors instead of coding the individual messages
that were sent. We chose this because we wanted to investigate what the contact looks
like between the actors in the network, which we considered was best described in the
proportion of conversations that existed between the individuals. We considered that this
clarified the relationships between the actors more clearly than coding each message that
was sent separately. Therefore, the result in such cases would be based on the length of
the conversations instead of the frequency of the contact between the individuals. Differences in chat styles can also affect the result if the coding is performed on each message instead of each conversation. If an actor chooses to write all the information in one message, the result will be different from an actor who chooses to send the same amount of information in many messages. One problem with the conversation material was that there were duplicates of certain messages. To ensure that each conversation was coded only once, each conversation was checked by comparing the current actors, date and time with the material we had already coded to ensure that the conversation was not coded again.

4.3 Essay credibility

4.3.1 Validity
According to the general validity criteria that Allwood and Erikson (2017, p.161) discuss, the results of studies must be credible, can be trusted and others must be able to arrive at the same result. Flick (1998, referenced in Allwood & Erikson, 2017, p.161) believes that studies have high validity if the study is based on empirical material and that the methods are well chosen and applied. The purpose of this essay was to map the group structure of a criminal network based on their joint participation in crime and communication, which was carried out with the help of network analyses of a criminal conviction and preliminary investigation. According to Sarnecki (2001, p.5), network analyses are an effective method in the study of criminal networks to, among other things, clarify the structure of the network. This proves the relevance of using network analysis as a method for measuring what we considered to measure, the network's structures and composition.

4.3.2 Reliability
Reliability is about whether the measurements are reliable and have consistency (Bryman, 2018, p.207). Since we are two people who have written this essay, the inter-assessor reliability may have been affected. The inter-assessor reliability means the conformity between the different observer's interpretations (Bryman, 2018, p.208). We have been aware of and handled this by analysing and coding the data in agreement with each other. Borgatti et al. (2018, p.61) states that smaller networks are extra sensitive to the loss of actors or links in terms of reliability. In our essay, a smaller network was analysed, which
means that it was extra sensitive to missing values. In the essay, we did not include the actual members of the network, but the descriptions of who participates in the network from the prosecutor, the verdict and the part of the EncroChat conversations that we had available. Thus, it was possible that there were missing values, but since we did not assume to study all actual members of the network but only those that were described in the material, this did not affect our essay. This applies in the measurements and analyses we made of the prosecutor's and verdict descriptions. In the EncroChat material, we only had access to a limited part of the conversations that existed, which means that there was probably an unknown proportion of missing values in members who communicate within the network. The EncroChat material only consisted of the messages that the prosecutor considered relevant to the preliminary investigation. This means that there were an unknown number of conversations between the actors that the prosecutor excluded from the preliminary investigation material. This can be assumed to affect the measurements and thus the reliability of the essay. However, it can be argued that since we make it clear that we only wanted to study the individuals we had available from our materials, the reliability would not be affected as much as if we aim to study the entire actual network.

4.3.3 Generalisability
Our essay describes a case study of a criminal network based on three materials with a respective network analysis plus an analysis of a merger of all three networks. Since our data is limited to a criminal network, a verdict and a preliminary investigation, this can be assumed to have affected the generalisability. As Bryman (2018, p.98) states, case studies can affect the generalisability as these examine only one case and can therefore not be considered with certainty to be representative. The structures that emerged in this case study can thus not be considered representative to other criminal networks. To answer the question of whether the structures we made visible with our essay can be generalised to other criminal networks, further research and similar studies are required.

4.4 Ethical considerations
The materials we have used are public documents, which entails both difficulties and a discussion for our study. The publicity of the material means that the information we use that can be linked to individuals is already available to the public, which makes it possible to argue for using names and other identifiable information. However, given the
individual protection requirement, we believed that it was essential to try as much as possible to de-identify and pseudonymise the information used that can be fed back to individuals. The individual protection requirement means that individuals who participate in research must be protected from harm and violation (Swedish Research Council, 2017, p.13). This also applies to the verdict, which in its capacity as a public document means that it can be identified through the information mentioned in this essay. This entails a difficulty for us as the publicity of the material entails a higher requirement for de-identification and anonymisation to ensure acceptable ethics. At the same time sufficient information is included for the essay’s results to be considered acceptable. Therefore, to ensure that the essay is ethically acceptable, we have chosen to de-identify the network and the individuals. We have therefore not mentioned the names of the individuals, which verdict we have used and which criminal network we have analysed. This is why we have not referenced the verdict or the preliminary investigation. We pseudonymised the individuals into numbers. However, as mentioned above, there is still a risk that the network and the individuals can be identified by the information we provide in the essay being linked to the specific criminal case. We have tried to handle this by only highlighting the information that is relevant to our essay.

Because we use public documents, we will not be able to obtain consent or inform the individuals concerned in accordance with the consent and information requirement. Therefore, we have chosen to de-identify these in order to meet the confidentiality requirement. This means that the information about the people included in the essay must be treated with confidentiality (Bryman, 2018, p.170). We will also store information that can be linked to individuals in the essay in such a way that unauthorised persons do not have access to it to ensure that the confidentiality requirement is met. We will thus not store information that can be connected to individuals on a hard drive or in any other way that means that unauthorised persons can gain access to the information. The information requirement means that the participants in the study must be informed of its purpose and that they have the right to drop out of the study whenever they want (Bryman, 2018, p.170). The consent requirement means that the participants themselves have the right to decide on their participation in the study and must therefore give consent to this (Bryman, 2018, p.170). These will not be fulfilled as we do not have the opportunity to contact the individuals in the essay. We will therefore place greater focus on treating the material with the greatest possible confidentiality so that no unauthorised persons will be able to
identify the individuals in the essay. Borgatti et al. (2018, p.46) states, however, that all network designs assume that all respondents are identified in the raw data. Which means that it is only confidentiality that researchers can offer. In the raw data, the respondents have been identified so that we can connect respondents to actors. Therefore, the respondents will not be able to be kept anonymous in the raw data. These will then be pseudonymised so that no one but the writers of this essay will be able to identify the respondents at a later stage. This is done so that we can ensure that all actors are the same in all networks, for example that actor 1 is actor 1 in all networks.
Chapter 5

5.1 Results and analysis
The results will be presented through figures which will be commented on. The results will be presented through a review of the two network analyses that concern co-offending and then the analysis of the EncroChat-communication networks. The result will then move on to a presentation of the network analysis where all networks are merged. These presentations will consist of analyses of eigenvector centrality and an ocular analysis of the network. An analysis of the most central actor’s direct contacts will also be carried out on all networks. We will also present analyses where the prosecutor's assessment of roles within the network has been applied and the length of the sentences will be implemented in the verdict-network.

5.2 The two co-offending networks (verdict and prosecutor's claim)

Figure 1: Co-offending network based on the verdict-material
Figure 2: Co-offending network based on the prosecutor's claim

Figure 1 shows the co-offending network based on the verdict material. This network consists of 30 actors and 550 links that weighted became 141 links. Figure 2 shows the network which consists of the prosecutor's description of complicity. This network consists of 33 actors and 843 links that weighted becomes 186 links. To remind, this means that when a link is weighted that it has occurred several times, in this case that the individuals have committed crimes several times together.

Both networks can be observed to have similar structures. The networks consist of a large central group that contains the most actors. Then there are two smaller groupings on each side of the central group. In both Figure 2 and Figure 1, actor 8 and actor 6 have a strong link. In Figure 2, actor 8 and actor 2 have a stronger link than the remaining links. In Figure 1, however, actor 8 and actor 1 have a stronger link to each other than the remaining links. This means that these actors have committed several different crimes together. There is thus a group of individuals in the networks who receive a high crime rate together. The actors who are located on the outskirts of the network with few links are thus only involved in crime sporadically and occasionally. The results may be a result of them specialising in certain types of crime and therefore having only occasional criminal charges. It is also possible to interpret these actor's few links as meaning that
they are only involved in the network sporadically and with few contacts in the network. To confirm these interpretations, further studies on the characteristics of the crimes are required.

Figure 3: Centrality of the co-offending network (verdict)
In Figure 4 and in Figure 3, eigenvector centrality can be seen by both the size of the nodes and the colour they have. The larger and darker the node, the more centrality it acquires. The actors that receive the most centrality in both networks is actor 8 and actor 1. In both networks, actor 15, actor 9, actor 2 and actor 14 also receive high centrality. The central actors differ slightly between the networks, where Figure 4 shows that also actor 10, actor 6 and actor 3 receive high centrality within the prosecutor’s co-offending description. These actors also receive centrality within the network according to the verdict, but not with the same strength as in the prosecutor's crime description. In both networks, it can be seen that many actors receive high centrality in both size and colour. Only a few actors have low centrality. Both networks follow the same pattern where the actors with low centrality are represented by the nodes on the edge of the network. The networks can be read to have three parts where the middle part contains the most actors and the actors with the strongest centrality. Then there are two smaller groups on each side of the central part of the networks. This result indicates that the most central actors located in the middle of the network are also those who are charged with most crime and commit the most crimes with each other. The difference between the verdict and the prosecution network that has been observed may be due to the fact that the actors who receive high centrality in the prosecution-network were acquitted of certain crimes. Which meant that their centrality decreased in the verdict network.
Figure 5: Actor 8 direct contacts in the Co-offending network (verdict)

Figure 6: Actor 8 direct contacts in the co-offending network (prosecutor's claim)
Figure 6 and Figure 5 show actor 8's direct links. These links are coloured blue. Figure 6, which shows co-offending based on the prosecutor's request, shows that actor 8 receives 27 direct links with other actors. Figure 5, which shows co-offending based on the verdict, differs slightly from Figure 6, where actor 8 only has direct links with 23 other actors. Thus, this result can be interpreted as meaning that actor 8 obtains a very significant role within the network. However, the difference between the proportion of actors in which actor 8 does not receive direct links is minimal, with six and five actors respectively in each network. This difference is probably a product of the fact that the verdict network includes a smaller number of actors than the prosecution network. In both networks, actor 8 receives the most frequent criminal load with actor 1 and actor 6. Figure 6 shows that actor 8's co-offending in the prosecution network differs slightly from the verdict network as actor 8 also has strong criminal ties to actor 14 and actor 3, which is not shown in the verdict-network. Figure 5 depicting actor 8's accomplice band in the verdict network, shows strong links between actor 10 and actor 15. Figure 5 shows that the strongest link in the verdict-network for actor 8 is the link to actor 1. The link between actor 8 and actor 6 is the strongest link from actor 8 in the prosecution network. This means that these actors have committed the most crimes together.
Figure 7: The roles of the actors in the co-offending network (the prosecutor's claim)

Figure 8: The roles of the co-offending network (verdict) actors and the length of the sentences
In this part of the report, an analysis of the prosecutor's interpretation of the actors' roles will be carried out. Therefore, the actors to whom the prosecutor refers have significant roles within the network are presented through different colours. In Figure 7 and Figure 8, the orange node is the actor that the prosecutor identified as the leader of the network. The yellow node is the actor with the role of site manager and the blue nodes are actors who have the role of captain. The nodes that are green mean that the actor holds the role of captain in the field. The red nodes are the actors in the network that are referred to as soldiers. These are written in hierarchical order.

In Figure 7 and Figure 8, the result shows that the most central actor in the network analysis, actor 8, is also the actor that the prosecutor has pointed out as the leader of the network. This means that the prosecutor claimed that actor 8, the leader of the network, is the one who commits the most crimes with other actors in the network. Actor 8 also has links with all actors that the prosecutor pointed out as actors with leading roles in the network. It can also be interpreted that actor 8 has a strong link with the actor who is designated by the prosecutor as the site manager, actor 1, in both of the network analyses. This is also something that supports the prosecutor's thesis about the relationship between the leader and the site manager.

Something that can be discussed, however, is whether the prosecutor has missed the role of certain actors in the networks. These can be observed to be actor 14, actor 15 and actor 10. All of these three actors are designated as soldiers in the network according to the prosecutor. The network analysis depicted in Figure 7 shows that actor 14 has a very strong link with actor 8, the designated leader. In Figure 7, it can be observed that actor 14 has a strong link with actor 3 who is designated as captain and actor 9 who is designated as captain in the field. This connection can also be observed in Figure 8, where actor 14 has a strong link with actor 2 who was appointed captain in the field by the prosecutor. Actor 8 also has strong links to actor 10 and actor 15 in both networks, who have also been identified as soldiers by the prosecutor. Both actor 10 and actor 15 also have a strong link to actor 1, who is the designated site manager, and actor 6, who is one of the designated captains. This presents a different picture of their roles than what the prosecutor is claiming. It may therefore mean that the prosecutor missed a connection between the individuals and a more significant role for them within the network.
In figure 7 and figure 8 it can be seen that the actors who are designated as captains, actor 6, actor 3 and actor 11, receive no or minimal co-offending with each other. Actor 6 receives the strongest links in both networks with the leader, actor 8, and the site manager, actor 1. Actor 6 also receives links to actor 2 in both networks and actor 19 in the co-offending network based on the prosecution material. Both of these actors are designated as captains in the field. As captains are hierarchically superior to captains in the field, this can mean that actor 6 acts as an intermediary between the captains in the field and the leader and the site manager. Actor 2 and actor 19 receive certain links to actor 8 and actor 1, but these are minimal, which indicates the hierarchical distribution that the prosecutor means. However, the same relationship cannot be said to apply to actor 3 and actor 11 who are also designated as captains. These receive some contact with the leader and the site manager, but not to the same extent as actor 6. The relationship that was clarified between captains and captains in the field can also be observed for these actors. However, the captains in the field, actor 9 and actor 30, differ in their links to the site manager and the leader where they receive approximately the same strength off the links as the captains.

In this part of the analysis, the actors that correspond to the prosecutor's role description in the co-offending networks have been presented. Therefore, any actors who deviate from the prosecutor's description must also be presented. In Figure 7 and Figure 8, it can be seen, for example, that actor 30, whom the prosecutor describes as a captain in the field, has very few and weak links. Actor 30 also has a position in the network analysis which indicates that the actor does not have a central role as it is located towards the edge of the network. This phenomenon can also be observed in the two network analyses with actor 11 designated by the prosecutor as captain. In Figure 7 and Figure 8, both of these actors have only a few, weak links with other actors. This means that the actors do not commit crimes to the same extent as other actors. This may mean that these actors do not have as central a role as the prosecutor states.

Throughout the network the actors that the prosecutor has pointed out to hold specific roles within the network are also the actors who were sentenced to the longest prison term. Actor 8, who is the designated leader of the network by the prosecutor, was the one who was sentenced to the longest sentence. Actor 3, who is a designated captain, was also
sentenced to one of the longest sentences. However, actor 14, who has been designated a soldier in the network by the prosecutor, was one of the actors sentenced to the most months in prison. This pattern can also be seen in actor 10 who has been sentenced to one of the higher penalties in the network. This means that these two actors have committed either a lot of crime or more serious crime. This demonstrates their significant role in the criminality of the criminal network. However, this is something that cannot be seen with certain actors that the prosecutor believes have a high role. These actors are actor 19, actor 9, actor 11 and actor 30. These actors have been given sentences that are of the lower degree. The result thus differs from the prosecutor's assessment as these actors do have a significant role in the network, in terms of the criminal network's crime.

5.3 The communication network

Figure 9: The EncroChat-communication network
The EncroChat-communication network in Figure 9 consists of 54 actors and 614 links that are weighted into 123 links. The network consists of a central centre with actors with the heaviest links. These actors with the heaviest links are 15, actor 1, actor 3, actor 30, actor 2, actor 8, actor 6, actor 10, actor 14 and actor 9. The remaining actors receive a smaller proportion of links and weaker links. It can be observed that the communication network receives relatively scattered links and with only a few actors who have strong links. This can be interpreted as a few actors receiving a lot of communication to many actors while many actors only communicate occasionally to a few actors. The actors who receive the most communication consist of a compact group in the middle of the network. This can be compared to the structures that Thrasher (2020, p.290) describes where gangs often were made up of a small, compact group surrounded by smaller groups. It is also possible to observe a smaller grouping at the edge of the network with seven actors who receive contacts with only actor 14. Actor 14 receives a strong link to actor 8.
In figure 10 eigenvector centrality can be read both in the size of the nodes and in the colour. The larger and darker the node, the more centrality it acquires. The actors that receive the greatest centrality can be read as actor 8, actor 9, actor 1, actor 6. Many actors thus receive strong centrality both in size and colour. Actor 30, actor 10, actor 2, actor 15 and actor 3 also receive strong centrality. Actor 11 and actor 14 also have strong centrality. Actor 11 is located in the middle of the network with many different contacts while actor 14 is located at the edge of the network. Actor 14 has some contacts with actors in the middle of the network and can be observed to have its own “mini network” on the outskirts where actor 14 acts as the sole contact to 7 actors. It can be seen that the actors with the strongest centrality have the most contact with each other.
Figure 11 shows actor 8’s direct links. The nodes that actor 8 has direct links with are coloured blue. The network pictured above shows that actor 8 receives 27 direct links with other actors. Actor 8 obtains strong links to actor 14, actor 10, actor 6 and actor 1. What can be observed in this figure is that actor 8 also has many weak links to many actors. This means that actor 8 only receives minimal contact with certain actors but strong contact with other actors. Actor 8 obtains the most contact with actors who are located centrally in the network. Actor 8 also has the strongest links with those actors that are located centrally in the network. This means that actor 8 has the most contact with the most central actors in the network and only sporadic contact with the actors that are located on the outskirts of the network. The group referred to by BRÅ (2016, p.13) as “Suburban and district-based groups” can be compared to the result of the network analysis in figure 11. BRÅ believes that the structures in these types of groups are built around a central leader, which can also be observed in figure 11. This figure, as well as figure 10, figure 6, figure 5, figure 3 and figure 4 shows that actor 8 clearly obtains a central role within the network via contacts and centrality measures. It can thus be assumed that the structures presented by BRÅ (2016, p.13) are applicable to actor 8.
In this part of the report, an analysis of the prosecutor's interpretation of the actors' roles will be carried out. Therefore, the actors to whom the prosecutor refers have significant roles within the network are presented through different colours. In Figure 12, the orange node is the actor that the prosecutor identified as the leader of the network. The yellow node is the actor with the role of site manager and the blue nodes are actors who have the role of captain. The nodes that are green mean that the actor holds the role of captain in the field. The red nodes are the actors in the network that are referred to as soldiers. These are written in hierarchical order.

It is possible through a visual analysis to distinguish that the actor that the prosecutor believes is most central in the network, the leader, is also the actor that according to the network analysis is most central, actor 8. It can be distinguished in figure 12 that actor 8 has the most links and most strong links. Actor 8 also has strong links to the actor the prosecutor means to hold the role of site manager, which is actor 1. This indicates frequent communication between the leader and the site manager. It can also be interpreted that actor 8 has communication with all actors who have a central role in the network according to the prosecutor, although this contact can be interpreted to be more widespread. For example, it can be distinguished that actor 8 has very sporadic contact with the actors that the prosecutor designates as captains in the field, actor 9, actor 2 and actor 30. Here, however, it can be distinguished that actor 1 whom the prosecutor points out as site manager has a more frequent communication with these actors. Since actor 1 and actor 8 have a very frequent contact, it can be assumed that this acts as a kind of intermediary who passes on further information to the captains in the field from the leader.

It can also be distinguished that in Figure 12, actor 8 has very little contact with the actors that the prosecutor points out as captains, actor 11 and actor 3. Actor 8’s contact with actor 6, who is also designated as captain, is more frequent. Actor 8 also has several contacts with other actors in the network who have not been designated to have any prominent position. On the other hand, it is possible to distinguish that actor 8 has very frequent contact with two of these actors, actor 14 and actor 10. It can be distinguished, for example, in figure 12 that actor 14 has its own small network of actors who only have
contact with actor 14 in the network. This may indicate that actor 14 has a more prominent role within the network that the prosecutor may have missed. Actor 10 also appears to have a prominent role in the network, which is based on the contacts in Figure 12. For example, actor 10 has frequent contact with both actor 8, the designated leader, and actor 1 who is designated as site manager. Actor 10 can also be read to have frequent contact with actor 2 who is designated by the prosecutor as captain in the field. Again, it is not possible to say whether the frequent contact is due to the fact that actor 10 has a prominent role in the network that the prosecutor has missed or whether there is only one frequent communication anyway.

In figure 12, it can be discerned that actor 1 has frequent contact with all actors who are designated to have a specific role in the network. Here it is possible to clearly see the role that the prosecutor intends as “site manager” where actor 1 has contact and can be assumed to act as a manager for the actors who act as captains and captains in the field. It is also possible to distinguish that actor 1 has frequent contact with two actors that the prosecutor does not believe have any prominent role in the network, actor 10 and actor 15. Actor 15 also has contact with all captains and captains in the field. If this means that actor 15 has a specific role in the network, we cannot distinguish. Here, too, it can be discerned that actor 10 may have a role in the network that the prosecutor missed as actor 10 has frequent contact with the site manager, actor 1. What this role could mean here is also indistinguishable. Overall, it is possible to confirm through the network analysis the prosecutor’s thesis on which actors have leading roles. However, there are actors who, according to the network analysis, appear to play a more significant role than what the prosecutor has claimed.
5.4 The merged network

This network contains 75 actors and 2007 links. The prosecution network makes up 42% of the entire network. The EncroChat-communication network makes up 30.59% of the entire network. The verdict-network makes up 27.4% of the entire network.

Figure 13 shows an analysis of all the networks merged. Each colour of the links will represent one of the networks. The co-offending network based on the verdict-material will be represented with green links. The co-offending network based on the prosecution request will be represented with pink links and the EncroChat-communication network will be represented with orange links. When merging the networks in the Gephi program certain links overlapped. This occurred if the same links between two actors occurred within two or more of the networks. This resulted in some links being hidden. We have therefore chosen to show each type of network alone to clarify what they look like separately. These figures can be found in appendices.

In this part of the report, an analysis of the prosecutor's interpretation of the actors' roles will be carried out. Therefore, the actors to whom the prosecutor refers have significant
roles within the network are presented through different colours. In Figure 13, the orange node is the actor that the prosecutor identified as the leader of the network. The yellow node is the actor with the role of site manager and the blue nodes are actors who have the role of captain. The nodes that are green mean that the actor holds the role of captain in the field. The red nodes are the actors in the network that are referred to as soldiers. These are written in hierarchical order.

In Figure 13 and in Figure 14, Figure 15 and Figure 16 which are found in appendices, it can be seen that many of the actors who receive links in co-offending also have links in communication through EncroChat. This indicates a connection between communication and co-offending. Which can be linked to the essay's theoretical starting point differential associations. The theory is that criminal behaviour is learned through interaction with others (Sutherland, 1992, p. 88-89). It can thus be assumed that the actors have communicated with each other and as a result committed crimes together.

What can be clearly distinguished in this network based on an ocular analysis is that the EncroChat-communication network receives more dispersed links and actors, while both the prosecution and verdict network receive a denser network. This can be compared to the Rostami and Mondani (2017) study where the results of the network analysis of the EncroChat communication can be compared to The Red & White Crew network. The Red & White Crew had a few larger cliques and was overall less interconnected (Rostami & Mondani, 2017, p.42). These structures can be compared to those that emerge from the network analysis of communication where there are certain smaller groups that are closely interconnected and where the rest are less interconnected overall.

What is clearly visible in figure 13 is that the EncroChat-communication network has much more loose contacts where many actors only have single contacts with a few individuals. In the communication network, there are some key individuals who receive many contacts. In both the prosecution and verdict network, almost all actors receive links with many actors. In both of these co-offending networks, there are some actors who only have links with a few individuals. These can be seen at the top of the network in figure 13. The prosecutors and verdict network obtains a higher density in the network than the EncroChat-communication network, where many actors have only one or a few links to
other actors. In the communication network you can see a smaller network around actor 14 where many actors from the communication network only receive links to actor 14.

Figure 13 confirms that the actors identified by the prosecutor as leading actors hold significant roles within the network. This is because all actors that the prosecutor believes hold roles in the network are placed centrally in the network analysis. This means that these actors have a central role when it comes to committing crimes with other actors and communicating with other actors in the network. However, figure 13 also shows that actor 14, actor 10 and actor 15 are key actors in the network. These actors are also centrally located and have thus committed crimes with many actors and communicated with many. The actors also have many links to the actors that the prosecutor describes as prominent. This means that the results of the network analysis allege that the prosecutor has missed actor 10, actor 14 and actor 15 in the description of which actors are significant to the network.
Chapter 6

6.1 Discussion
In this section, we will discuss the results based on the research questions that the essay aimed to answer. The results that emerged from the different types of network analysis will be compared and discussed against each other and previous research. We will also discuss future possibilities.

6.1.1 How does the structure of the criminal network differ if the network analyses are based on data from the verdict, the prosecution's claim and the EncroChat communication?

This essay aims to compare the structures of co-offending networks with a network based on EncroChat-communication between the members of the network. The results of all the network analyses show that the networks are closely composed of a central “core” of individuals who commit crimes or communicate. The core of all networks consists mostly of the same actors with a few exceptions between the different networks. These are actor 8, actor 1, actor 2, actor 10, actor 9, actor 3 and actor 6. This can be compared to the structures that Thrasher (2020, p.290) describes where gangs often were made up of a small, compact group. Around this group, smaller groups were created by individuals who serve to protect the central core. These structures can be seen in both the communication and the co-offending network where fewer central actors are located on the edge of the networks. However, it cannot be established whether their roles are the same as Thrasher describes. The results also show that the actors who hold the largest share of correspondence with the most actors are also the actors who commit the most crime together. This can thus be linked to the essay's theoretical framework of differential associations which believe that criminal behaviours are learned through an interaction with others (Sutherland, 1992, p.88-89). Thus, it can be assumed that the actors have committed crimes together as a result of them communicating with each other. If this is the case, the theory can advantageously be used as an explanatory point why the actors have committed crimes together after they have communicated together. However, this assumption is only an interpretation as the essay does not have the capacity to examine the actual impact of communication on the actors' co-offending.

36
All the network analysis showed that the most central actor was actor 8 even though the actor did not have as many contacts in the EncroChat-communication network. The group referred to by BRÅ (2016, p.13) as “Suburban and district-based groups” can be compared to the result of the network analyses. BRÅ believes that the structures in these types of groups are built around a central leader, which can also be observed in the network analyses of EncroChat-communication and co-offending. The results of the network analyses shows that actor 8 clearly obtains a central role within the network via contacts and centrality measures. It can thus be assumed that the structures presented by BRÅ (2016, p.13) are applicable to actor 8.

This result can also be linked to the gang structures of co-offending that Sarnecki (2001) identified in the study. These studies showed that the structure of the networks consists of loosely composed groups. The results of this essay show that the EncroChat-communication network is more loosely composed than the two co-offending networks are. It is thus possible to identify similarities with Sarnecki (2001). However, the results of the two co-offending networks differ from Sarnecki’s (2001) result where these networks are much more closely composed. However, this may be a result of the limited material of the essay. In order to be able to draw clearer and more secure connections to previous network research, studies are thus needed that analyse the network's structure over a longer period of time. If the network is studied for a longer period of time, the essay can capture how the structure of the network changes over time. This means that other structures may emerge that this essay did not have the capacity for.

The result of the merged network confirms that the communication network has much more loose contacts than the co-offending networks, where many actors only have single contacts with a few individuals. The co-offending networks receive a higher density in the network than the communication network where many actors have only one or a few links to other actors. This can be compared to the Rostami and Mondani (2017, p.42) study where the three networks receive different structures. This can also be observed in the results of our essay. The Hells Angels network is quite interconnected as are the two co-offending networks in study. The results of the network analysis of the EncroChat-communication can be compared to The Red & White Crew network in Rostami and Mondani’s study. These structures can be compared to those that emerge from the network structures.
analysis of EncroChat-communication where there are certain smaller groups that are closely interconnected and where the rest are less interconnected overall. These results can also be compared with the results of De Moor et.al. (2018, page references are missing) study where implementation of an integration of DNA data and police-recorded crime data resulted in a richer network and greater dissemination. This can be compared with the result of the merge network where the integration of EncroChat-communication data and the co-offending data has given a richer and a more clearly spread network than the networks separately. This can be seen in the networks in Figure 14, Figure 15 and Figure 16 in the appendices where each network consisting of data from EncroChat-communication, judgments and the prosecution is presented.

6.1.3 Can the hierarchical roles assigned to actors by the prosecutor be found in the structure of the network?

To include another dimension in the analysis, we chose to include the prosecutor's description of roles in the network. To remind, the hierarchical order is based on the prosecutor's description and consists of the following: leader, site manager, captains, captains in the field and soldiers, written in hierarchical order.

The results showed a clear difference between the co-offending networks and the communication network of the location of the actors that the prosecutor has pointed out to hold specific roles. In the communication network, all of these actors are centrally located in the network. In the co-offending networks, certain actors with roles such as captain and captain in the field are placed on the edge of the network without particularly high centrality. This can be interpreted as meaning that the prosecutor's assessment of the actors' roles is more accurate in the communication network than in the two co-offending networks. In the communication network, all designated actors receive central roles with strong centrality, which is thus more in line with the prosecutor's role description. This may mean that the actors that the prosecutor assigns significant roles in the network are primarily in line with how the network communicates with each other.

Based on these results, it is possible to draw certain parallels to previous gang research. Thrasher (2020, p.209) concluded that the gang structure is often characterised by a small, compact, central group where smaller groupings acted outside the central group to protect
the central core. The actors who are both designated to hold central roles by the prosecutor and the actors who, according to our analyses, can be identified as constitute the “core” of the network. Around the central core are "soldiers" who hold low centrality and few contacts. This can be compared to what Thrasher et al. (2020, p.209) noted occurred in the gang structure where smaller groups acted outside the central core. This may thus explain the result that emerged in this essay where these "soldiers" act subordinate to the central core.

The results showed that the role descriptions that the prosecutor distributed to actors within the network could to some extent be confirmed by the network analyses. However, some differences emerged between which actors the prosecutor considered to be significant in the network structure and what emerged from the results. The results showed that actor 8, who is designated as the leader by the prosecutor, has a lot of contact with actor 1, who is designated as site manager. This link is strong, which means that they have committed crimes and communicated several times. The relationship that is made visible between the site manager and the leader is to be expected according to the prosecutor's role description. However, the remaining strong links that actor 8 has are of more interesting value. The results showed that actor 8 has committed the second most crimes and communicated second most with actor 6, who is a captain. Actor 8 also frequently communicated and committed crimes with two soldiers, actor 10 and actor 14. This can be interpreted in two ways: the first is that the leader, actor 8 sends out information to significant individuals in the network as the site manager, actor 1 then forwards the information to other significant actors. In this scenario, the leader also has strong contact with certain captains and soldiers for unknown reasons. The second way in which this can be interpreted is that the prosecutor has missed the importance of certain actors and therefore not assigned them roles. Actor 10 and actor 14 are some of these actors who, according to the results of the network analysis, have significant roles within the network. These receive frequent contact with the leader as well as with many other actors with and without designated roles in all networks. It can be seen in the EncroChat-communication network that actor 14 has a central role with strong connections to actor 8 who is designated as the leader of the network by the prosecutor. Actor 14 has no designated role by the prosecutor but was sentenced to the third highest sentence. This indicates that actor 14 has a strong significance for the network's crime and thus a central role. In the communication network, actor 14 has a specific role that stands out among
the remaining actors. Actor 14 can be seen as acting as an intermediary between the leader and external actors, where actor 14 acts as the sole contact with these actors. The role of actor 14 can, for example, be interpreted as a contact and seller in a drug trade where the actors who only communicate with actor 14 are buyers. This would explain the strong link between actor 14 and actor 8 as their contact in such cases was related to the ordering and distribution of drugs. To confirm this and study the properties of the relationships, further studies with elements of qualitative methods are needed.

Actor 19, who is one of the captains in the field, is only part of the co-offending networks, with a weak centrality and few links and is not part of the communication network. What could it be due to and why is it designated as a captain in the field if the individual did not participate in the EncroChat-communication? This can be interpreted in different ways: first, that the prosecutor possesses other information that is not available through the material that proves actor 19's role within the network. Another way of interpreting this is that the prosecutor has made a mistake and given actor 19 a significant role within the network when the actor does not hold such a role. What has emerged from the network analysis is precisely this, that the actor does not possess a significant role but only a minimal role and centrality. This is also confirmed by the fact that actor 19 is one of the actors who was sentenced to the lowest prison sentence. Similar phenomena can be observed for actor 30 and actor 11 who are designated by the prosecutor as central actors with significant roles. This is not something that the network analysis has been able to confirm. The results of the network analyses of co-offending have not made visible these features that the prosecutor claims. In the analyses, the actors have neither a central role nor strong links to significant actors. The network analysis instead showed that other actors who have not been recognized as significant by the prosecutor hold roles that can be interpreted as significant for the network. These include actor 10, actor 14 and actor 15, all of whom have been designated as soldiers in the network according to the prosecutor. These actors thus have no specific role and are placed low in the hierarchy according to the prosecutor, but a different result emerges from the network analyses. Actor 10 receives the majority of strong links with significant actors than actor 19 who is designated to play a significant role according to the prosecutor. This pattern can also be distinguished with actor 14 and actor 15, where the network analysis shows that these have a central role in the network. These three actors are also among the actors who were sentenced to the longest prison sentence. This means that these actors play a significant
role in the criminality of the criminal network. This can be interpreted as actor 10, actor 14 and actor 15 thus possess more prominent roles within the network than actor 19 which is designated as significant.

6.3 Future possibilities

One possibility with this material is to investigate the impact of communication between individuals on their co-offending. The EncroChat material opens up an opportunity for researchers to study how individuals communicate with each other and about what. Therefore, it can be used to study the connection between communication and co-offending. The EncroChat material on which this essay is based is part of the evidence used by the prosecutor to establish the criminality of the members of the criminal network. This has been possible because the actors have communicated about the crimes for which they were prosecuted. This opens up opportunities to study how members' communication has affected their crime and thus the connection between communication and co-offending. This essay has not had the capacity or time to investigate this, but it thus opens up for further research in the future. To study this, a qualitative approach can be used to investigate the properties of communication. This can then be combined with a quantitative network analysis to examine the relationship between communication and co-offending. The qualitative method can provide information about the nature of the communication and examine its actual impact on co-offending. This can also be used to discuss Sutherland's (1934) theory of differential associations. Sutherland et al. (1992, p.88-89) argued that criminal behaviour is learned through a process of communication with other individuals. Therefore, a combined qualitative and quantitative method can be implemented to study how this relationship is made visible on EncroChat and the verdict material. The material can thus be used to investigate whether Sutherland's (1934) theory can be applied in modern contexts how social relations between gang members affect the members' crime
Chapter 7

7.1 Conclusion
The purpose of this essay was to study the structure of a criminal network based on the member's co-offending and EncroChat-communication. To study this, a verdict material, a preliminary investigation material and a EncroChat-communication material were analysed by network analysis. These were analysed based on, among other things, role distribution and centrality. The results of the network analysis showed that there were structural differences between the communication- and co-offending networks. This exhibits that there are differences in how the network is structured and which actors are significant depending on which material is analysed. If the analysis is only based on, for example, co-offending, certain functions and structures can thus be missed. The results of the network analysis indicated that the actors who committed the most crimes also communicated the most. In the analysis of the prosecutor's division of roles in the network an interesting result emerged. The results showed that the prosecutor's division of roles did not fully agree with the results of the network analyses. From the network analysis, individuals emerged who could be observed to play a more central role in the network than what the prosecutor presented. This result can, of course, be a product of the secondary data collection and the EncroChat conversation's selective restriction by the prosecutor. However, it still highlights the advantages of the method where these results emerged in both the co-offending and EncroChat-communication networks. The results of this essay therefore exhibited the benefit of using network analysis in areas such as law enforcement. This is because network analysis can shed light on structures within the criminal networks that otherwise can be overlooked.
References


https://bra.se/download/18.3c6dfe1e15691e1603e1b5ca/1471871016717/2016_12_Kriminella_natverk_och_grupperingar.pdf


file:///C:/Users/moabj/Downloads/L%C3%A4rdomar%20av%20Encrochat%20-%20Sammanfattande%20rapport.pdf


Schreier, M. (2012). Qualitative content analysis in practice. Los Angeles. [Calif.]: SAGE.


Appendix

Figure 14: The verdict-links in the merged network

Figure 15: The EncroChat-links in the merged network
Figure 16: The prosecutor-links in the merged network