

# CASE STUDY

## Nivos Oy Is a Forerunner in Network Automation

**The Finnish network company uses both FLIR and a custom Switchover app**



Nivos Oy, a network company in southern Finland with about 15,000 customers, ranks among the forerunners in network automation. It is actively investing to automate its secondary substations and takes full advantage of FLIR automation.

### NETWORK AUTOMATION

Nivos's network encompasses five primary substations and 900 km of 20 kV distribution line. A further 1600 km of 400 kV service line connects to the end customers. Roughly 25% of the 20 kV distribution is underground cable; another 25% is isolated overhead line; and the rest is un-isolated overhead line. The network has approximately 90 automated points – disconnecter stations and secondary substations – with a total of 200 remotely controlled disconnectors.

All the primary substations have fibreoptic communication. So do as many of the secondary substations and disconnecter stations as possible – currently about 15%. The rest use Nivos's own private radio network.

The company's strategy entails increasing the share of underground cable to 50% within the next ten years, automating 5 more secondary substations

or disconnecter stations per year and investing in mobility. New remotely controlled substations are, as a rule, based on the Netcon 100. They are projected to have fault detection in all their feeders so as to provide more information for FLIR.

### SWITCHOVER

The area served by Nivos has several industrial plants for which uninterrupted supply of power is essential. During discussions between Nivos and Netcontrol, the idea was raised of developing a special function that could automatically switch the supply direction in case of an interruption along the main supply route. Thus the supply to a secondary substation or to an end customer could be restored within seconds.

The final solution took the form of a Netcon 100 "app" called Switchover. The Netcon 100 supports app(lication)s providing additional functionality that can be developed by the customer (network company) itself, by Netcontrol or by a third party. Switchover was developed by Netcontrol. Such apps have access to the Netcontrol 100 realtime database and are even capable of sending commands, which was indeed necessary in this case.



The idea is to run Switchover in those secondary substations that are the open points in their respective network rings and have the feeders coming from the opposite directions (one of them disconnected) supplied either by different bays of the same primary substation or by entirely different substations.

The voltage in both the feeders is monitored. Should the connected feeder lose voltage but the opposite one retain it, the disconnecter on the feeder that was supplying the substation is opened and the one on the opposite feeder is closed, restoring the supply. This is controlled automatically by the Switchover instance running in the Netcon 100 and happens within just a few seconds.

### FLIR COMMISSIONING

Nivos has been using the Netcon 3000 SCADA system since the mid 1990s. Hearing in 2013 about the positive experiences that others have had with FLIR – (automatic) fault location, isolation and restoration – the company quickly recognised the potential that this offered for maximising the automation of their network. With the Trimble DMS (distribution management system) already in place, the leap of testing FLIR did not seem a big one.

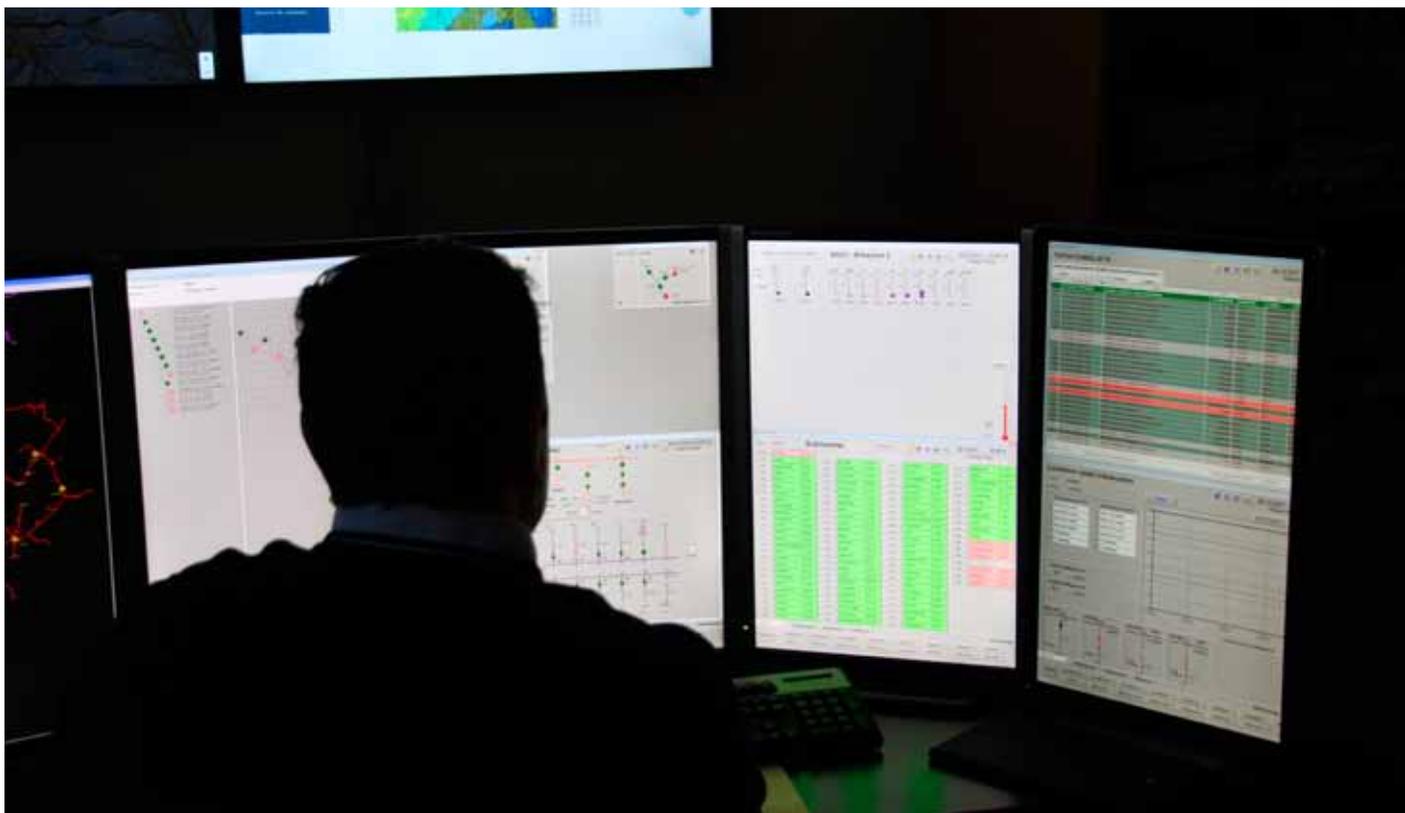
With the project started at the beginning of 2014, district-by-district testing of FLIR could commence in February. In May, the system was ready for semiautomatic operation. Here a human operator reviews the system-generated switching sequences before these are carried out. At this point, however, the project met an unexpected problem: the network remained fault-free for five months. So the first real tests could only be run at the end of 2014. Seeing that the system functioned correctly during faults occurring that winter, the Nivos control centre personnel were convinced that they could trust FLIR to handle the initial sectionalising of faults from that point on. FLIR was therefore switched to fully automatic mode in the May of 2015.

### FLIR IN PRACTICE

Since then, FLIR has helped the Nivos personnel sectionalise both occasional, isolated faults and large disturbances caused by bad weather. The August of 2017 saw a real test of the system – one that showed it to be highly reliable. A weather system christened Kiira battered the south of Finland with thunder and heavy downward winds, causing extensive local damage. Its devastating force reached the southern part of Nivos's distribution area. Within minutes, a third of its customers were without power.

Starting automatically as it should, FLIR set out to sectionalise the faults and restore supply wherever possible. New faults continued to arise. However, since FLIR left only the faulty sections without voltage, the Nivos personnel found it easy to institute a strategy for the work in the field: start from the primary substations and work your way outwards in the network. Given that the newly arising faults continued to be sectionalised by FLIR, the three network operators were also free to concentrate on directing the work in the field. After just two hours, the number of customers without power had been reduced from 4700 to 1000. After two more hours, the figure was 600. The following morning, twelve hours after Kiira had started, only 100 customers remained without power.



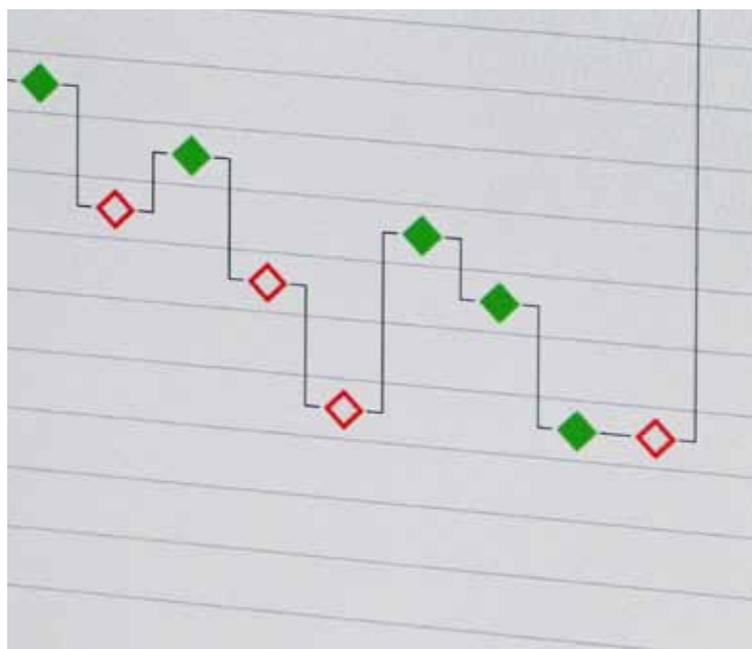


## EXPERIENCES OF FLIR

Head of Operations Jarno Virtanen explains that Nivos's control centre is manned only when necessary. Each person serves as chief operator for one week at a time but need not remain at the control centre. He can be on-duty from home, for example, using a laptop computer. Even an interruption does not usually mean a big hurry because the initial sectionalising is handled automatically by FLIR. Once it is done after a couple of minutes, the chief operator can start directing the fieldwork; his aim is to minimise the remaining powerless sections through the use of manually operated disconnectors. Should the interruption happen at night, the chief operator being awakened by an alarm, FLIR will have already taken care of the automatic sectionalising before the operator has had time to fully wake up.

During larger disturbances, the chief operator earlier had to work more to sectionalise the faults; now he can concentrate on directing the fieldwork. This change has been a major improvement for the field personnel.

The correct functioning of FLIR does, of course, presuppose a complete and up-to-date network model and the inclusion of all the necessary information. Nivos no longer uses yellow Post It notes even during larger disturbances. This, in turn,



## *“The payback period for FLIR was very short”*



makes the operations more systematic, reducing the risk of errors and improving work safety.

Finally, the sectionalising-related work is just carried out far more quickly by FLIR than it would be by a human. What FLIR now handles in 3 minutes would earlier have taken, say, 15. The change is also evident to the end customers. Since most of the customers now have the service quickly restored, Nivos receives much fewer phone calls during interruptions. Another consequence is that the interruption penalty fees paid by the company have been reduced almost by one half since FLIR was introduced.

Even the immediate operational costs of faults are now much lower. The work progresses faster because the field personnel can be used more effectively. They spend less time waiting and less time driving. The extra operational costs associated with Kiira, for example, were €250 000

– when they might have been double that without FLIR and other network automation, estimates Jarno Virtanen. Thanks to FLIR, the company only had to pay €20 000 in interruption penalty fees, a fraction of what the penalties would have been without FLIR.

Jarno Virtanen sums up Nivos’s experiences by saying, “The payback period for FLIR was very short”.



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