KASM: ICCP Link

Physical Architecture Design Document

Strategy for Inter-Control Centre Communication Protocol (ICCP) - Addendum

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Contents

1 Introduction

The main objective of the Kent Active System Management (KASM) project is to develop a better understanding of the power flows in the East Kent Area network under different generation/demand scenarios. As the distribution and transmission networks become increasingly interdependent and Distribution Network Operators (DNOs) transition to Distribution System Operators, the requirement for real-time data exchanges will increase. The KASM project has deployed an Inter-Control Centre Communication Protocol (ICCP) link that connects the DNO and TSO control rooms in order to make these exchanges possible.

1.1 Background

The KASM project aims to carry out a range of technical innovation trials to demonstrate operation that is more transparent and planning of the 132kV network in East Kent, in the South Eastern Power Networks (SPN) area. It is envisaged that the project will deliver benefits that will span across various areas, including the enablement of low carbon generation, the deferral of capital-intensive reinforcement projects and improved reliability of the network.

The last few years have seen a number of Grid Supply Points (GSPs) come under pressure from the level of generation on the electricity networks exporting their power. This is the most extreme form of the electricity network operating in the opposite way to which it was originally designed, where sections of the network are not only supplying their own demand but also exporting the surplus onto the transmission system.

The East Kent area contains two of the estimated 350 GSPs nationwide. A third GSP is being established in the area. Nevertheless, the East Kent network currently requires 34 contingency scenarios to be analysed in order to understand the network fully. The massive uptake of wind and solar generation in recent years due to government incentives, and the presence of interconnectors connected to the transmission system, increases the number of generation patterns that need to be analysed – there is no longer a simple ‘day of highest winter demand' and 'day of lowest summer demand'. There is more variation and hence a greater requirement to monitor all contingencies; and a growth in the number of GSPs being affected.

Contingency analysis is a valuable tool to predict the effect of outages such as failures of overhead lines and to take actions to keep the distribution network secure and reliable. UK Power Networks (UKPN) will trial for the first time the use of Contingency Analysis on the Great Britain (GB) electricity distribution network. It will also be the first trial of the implementation on a coordinated and interfaced basis with the electricity transmission network.

The KASM project will tackle and demonstrate the value of Contingency Analysis Software (CAS) in operational timeframes on the network in East Kent, delivering estimated net benefits of £0.4 million. Once proven successful, replication of this method across GB could provide net benefits of over £62 million over the lifetime of the 45 year investment, when compared to business-as-usual approaches.

The KASM project is designed to address a number of pragmatic issues related to reliability, capacity, and outage planning. The project will:

- Install a communication link between UKPN’s control room and National Grid Company’s (NGC) control room;
- Install a CAS tool in UKPN’s control room;
- Develop complementary forecasting capabilities for load and generation in SPN’s control desk; and
- Trial the use of the above tools in real-time, short-term, and long-term use cases.

1.2 Purpose of Document

This document is an Addendum to the main SDRC 9.1 report, *Strategy for Inter-Control Centre Communication Protocol (ICCP)*. The following sections reflect the change made to the Technical Architecture to improve resilience.

1.3 Scope

The scope of this paper is to highlight the improvements made to the physical network design of the ICCP solution. The following sections show the original design and the improved design. This Addendum should be read in conjunction with the original SDRC. 9.1 report.

2.1 ICCP Architecture Physical Design

During testing of the ICCP Technical Architecture, it was identified that certain amendments could be made to the design which would further improve resilience and business continuity. The following figures reflect the updates to what was originally specified in the SDRC 9.1 report:

- High level view of the Technical Architecture
- Communication links between control centres

2.2 High Level Technical Architecture

Figure 2- High level Technical Architecture (revised) replaces Figure 1 - High level Technical Architecture as defined in the original SDRC 9.1 report.

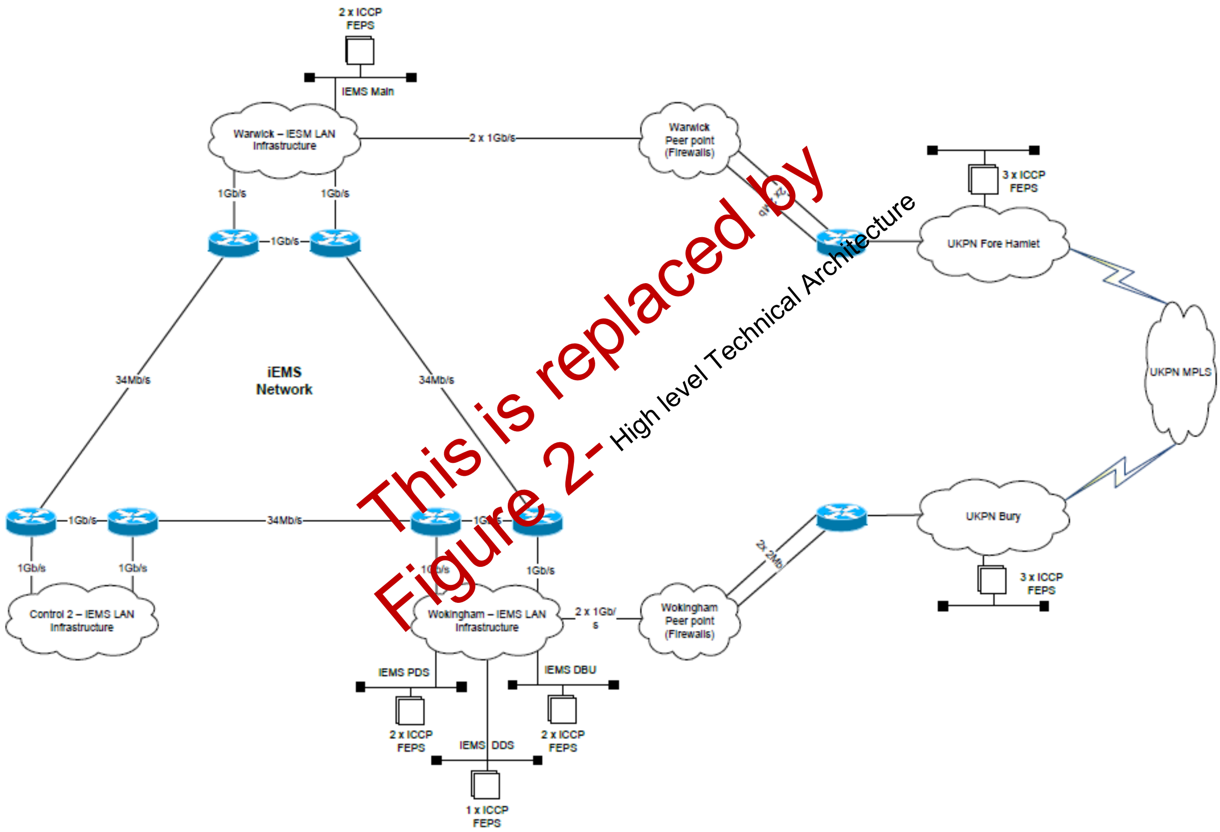

Figure 1 - High level Technical Architecture

In order to improve resilience of the system, two new routers and an additional communication connection were added to the original design between Wokingham (an NGC site) and Fore Hamlet (a UKPN site) – as highlighted in **Error! Reference source not found.** below. This design change will automatically re-route any network failure between Warwick (NGC) and Fore Hamlet (UKPN) to Wokingham (NGC) and Fore Hamlet (UKPN), thus keeping ICCP active through Fore Hamlet at all times. If, for any reason, Fore Hamlet services are not available, the ICCP traffic will automatically be channelled through Bury (UKPN).

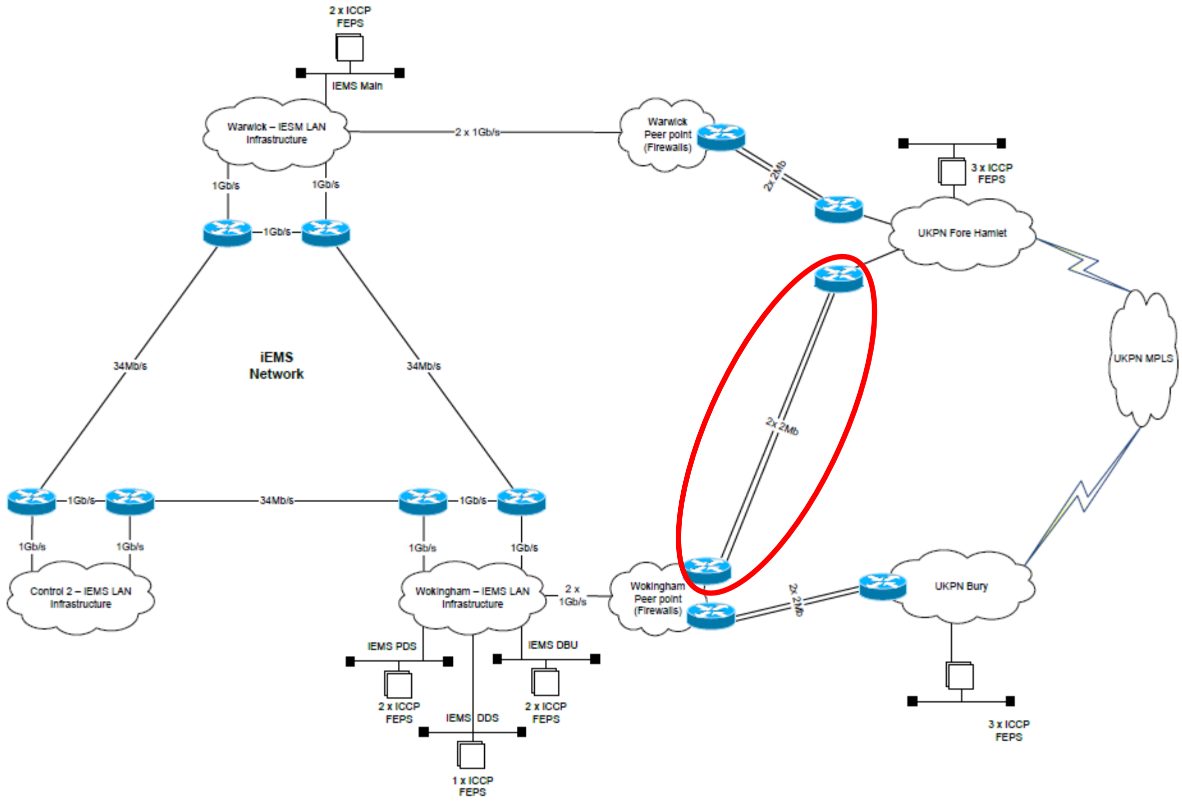

Figure 2- High level Technical Architecture (revised)

2.3 Communications Architecture

This section highlights the changes introduced to the communications WAN architecture as proposed in the original SDRC 9.1 report. Figure 4 - New ICCP WAN Links (Revised) in this document replaces Figure 3 - New ICCP WAN Links in the original SDRC 9.1 report.

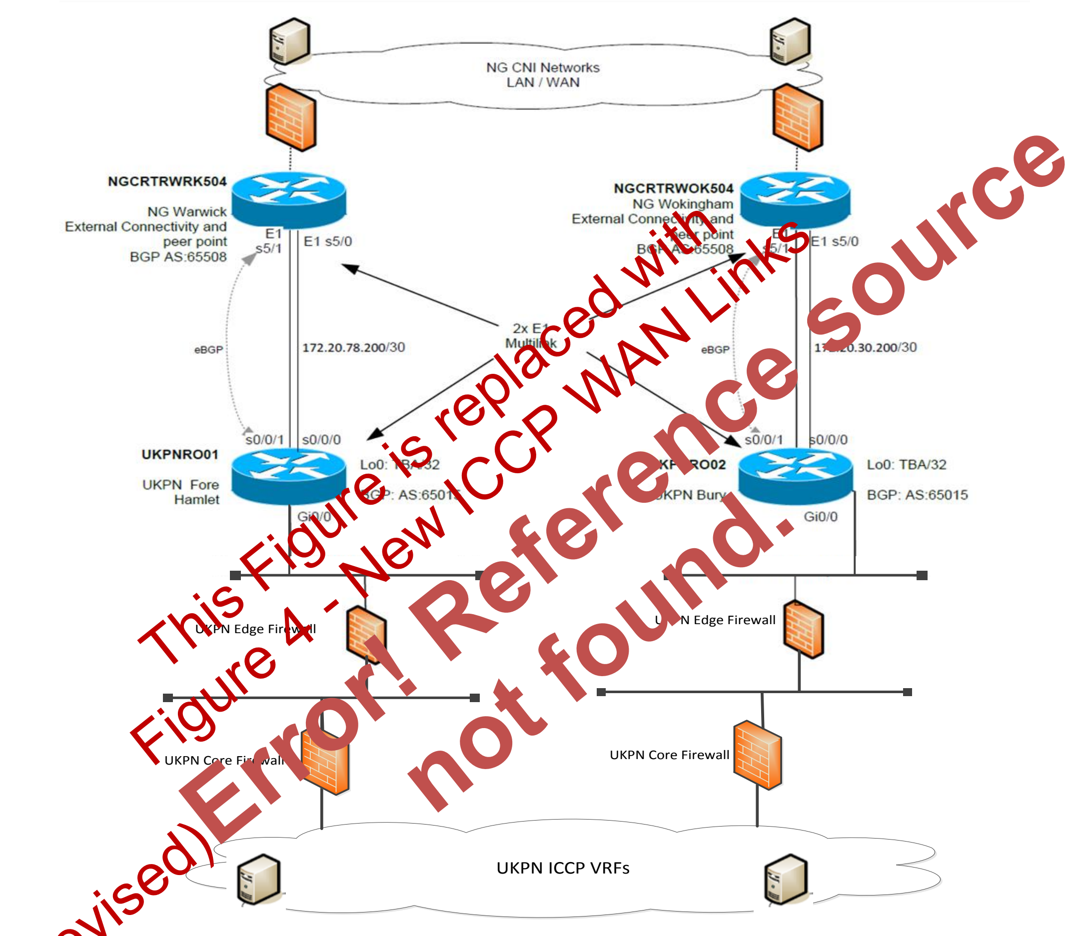

Figure 3 - New ICCP WAN Links

As part of the improvements, an additional communication connection and router were added to the original design, as highlighted in **Error! Reference source not found.**. This change in design enables improved ICCP resilience in the event of network failure between Warwick (NGC) and Fore Hamlet (UKPN).

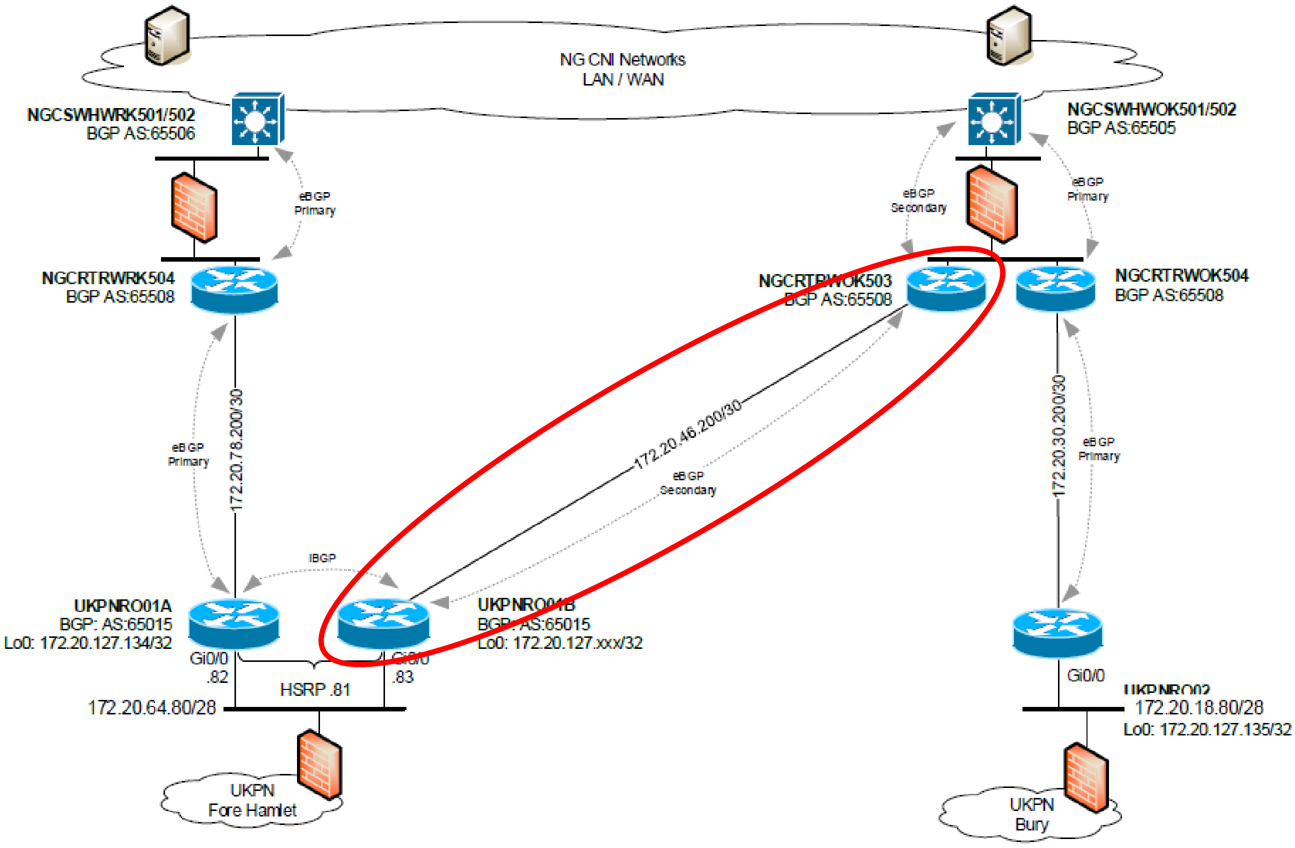

Figure 4 - New ICCP WAN Links (Revised)

2.4 Conclusion

This document supplements the SDRC 9.1 report *Strategy for Inter-Control Centre Communication Protocol (ICCP)* and replaces Figures 7 and 8 in the main document. The enhancement to the design has introduced a higher level of resilience to the ICCP solution.