MatrikonOPC

OPC Redundancy – Power of Prevention

MatrikonOPC-2006

Executive Summary

There are thousands of highly interconnected and dynamic systems, both public and private, that make up North America's electric power grid. These utilities have incorporated a wide variety of information and communications systems to automate the control of electric power generation, transmission, and distribution. Every aspect of our daily world depends on the uninterrupted flow of data and communications, and to keep it flowing, OPC is increasingly playing a mission-critical role in the power industry.

Power of Prevention

The electric power industry is undergoing significant changes due to pressure from marketplace forces, and legislative or regulatory activities. The functions of power generation, transmission, and marketing which traditionally have been tightly integrated are now being separated within utilities or different companies. This shift, in conjunction with increased competition, aging proprietary systems, and staff reductions are leading utilities to rapidly expand their use of information systems and to interconnect previously isolated networks. In many cases OPC is being used for these crucial system connections.

In the early days of OPC adoption, systems tended to be limited to supervisory applications, history collection and auxiliary data systems. This was due mainly to a reluctance to use PC based platforms in the control environment. As Microsoft operating systems and Ethernet based communications became more reliable and accepted, major SCADA and control system vendors introduced application platforms, engineering consoles and operator stations running on PC hardware. These factors coupled with the rise of OPC as the preferred communication standard, has led to an accelerating penetration of OPC into mission critical architectures. OPC is now a cornerstone component of many power related applications such as energy management systems, field data collection, turbine-compressor monitoring, burner systems, radiation detection and reporting, and many more. This has significantly increased the need to assure that OPC can deliver reliable, 24 x 7 operation in all aspects of the power industry.

What Defines Mission Critical?

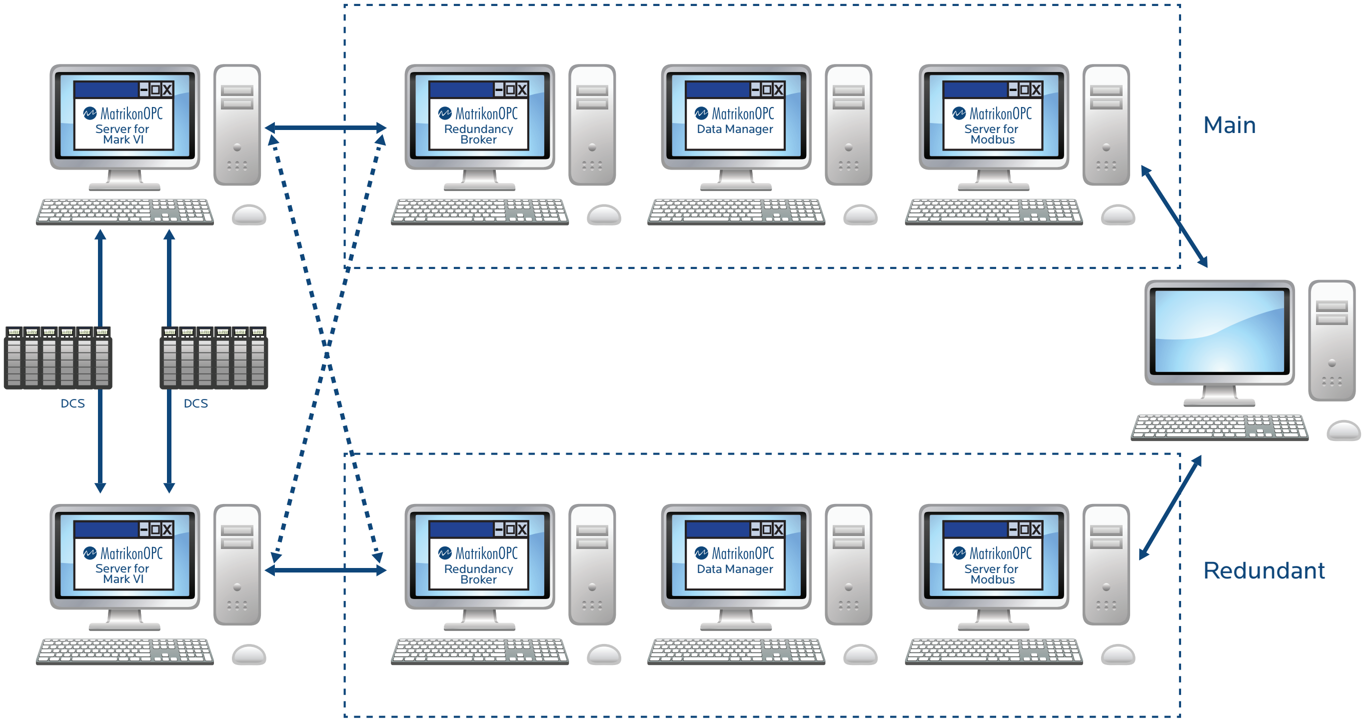
While there are differences of opinion about the definition of mission-critical applications, the general consensus of what "mission critical" means centers on the following attributes:

- Critical role: The role of software in fulfilling the mission must be crucial to the successful performance of the organization in which it is used.
- Critical view: The operational or controlling view of the system must be maintained at all times to ensure safe or proper operation.
- Critical data: Environments which monitor, store, support and communicate data cannot lose or corrupt the data without compromising their core function.

Once an application or components of an architecture are deemed to be mission critical, the next step is determining what can go wrong. A basic OPC system is comprised of an OPC client on one PC, communicating over the network to the OPC server on another machine. This involves multiple opportunities for system failure, including hardware faults, software or operating system incidents, and cabling or network routing failures.

How do you prevent the Loss of Mission Critical Systems?

One guiding principle for OPC mission-critical design is that the infrastructure is only as reliable as its components. The entire system must be made fault tolerant and able to remain functional in the event of a failure of one of the components. Adding redundant components significantly increases both fault tolerance and system reliability. In response to this need many OPC vendors are supplying products that enable OPC redundancy at multiple levels in the OPC architecture. A common system configuration is the three tier redundancy model.

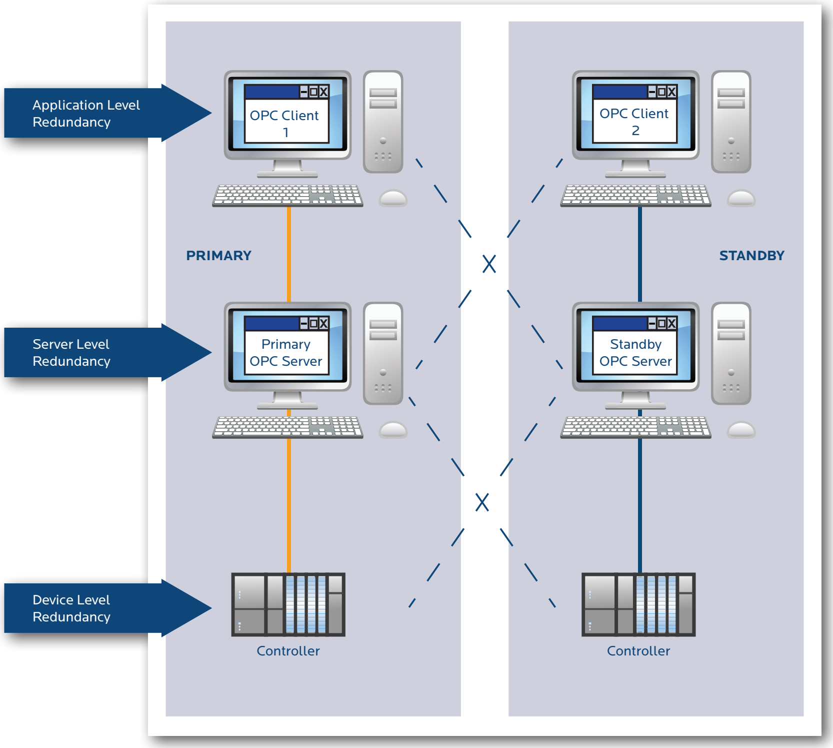


As the name implies, this model applies redundant software and communication channels at the three major levels of the architecture; the OPC client application, the OPC server and the end device or data source.

Often in mission critical systems, the controller or data collection device is of a fault tolerant design and is implemented in a redundant primary/secondary configuration. In order for an OPC server collecting data from these devices to seamlessly handle the dual configuration, it needs to have been designed to support device level redundancy. This means that a single OPC server can fail between two devices configured as a redundant pair, in a timely fashion without any action required by the OPC client. Increasingly more OPC vendors are offering OPC servers that support device or communication channel redundancy, particularly for controllers that are commonly installed in a redundant configuration.

Server level redundancy behaves in a similar manner, in that a single OPC client can fail between two OPC servers that have been implemented as a redundant primary/secondary pair. Typically this requires that the OPC vendor has implemented the redundancy functionality as part of the OPC client design. However, due to the nature of the OPC standard, server level redundancy is possible even if the OPC client has not been designed for redundancy. Since any OPC client can communicate with any OPC server, a redundancy enabled middleware application or broker can be inserted into any OPC architecture. The OPC redundancy wedge proxies all communication between the OPC client and the redundant OPC server pair and handles all aspects of the failover, such as how and when failover occurs, initiating connections, and OPC item management and clean up.

The final tier, application level redundancy often encompasses more functionality than just the OPC client connections. A typical configuration involves two applications running as a redundant pair that are continuously exchanging 'heartbeat' messages or status information. In the event the secondary application losses communication to the primary application, it will establish a connection to the OPC server and assume the data collection responsibilities. In some cases data collection is deemed critical due to regulatory requirements, such as the data required for U.S. Environmental Protection Agency (EPA) reporting. A real world use case is the Continuous Emissions Monitoring Systems (CEMS) used to collect data for the Environmental Group at Santee Cooper. The CEMS system provides information on gas turbine operation to ensure environmental standards are enforced. This critical system must function correctly



and the data stream must be continuous. Emission reporting requires a minimum 98% uptime. Failure to meet reporting standards could result in fines and other penalties. Santee Cooper uses MatrikonOPC products in a multiple level OPC redundancy architecture to ensure meeting this requirement.

Although the stability of off-the-shelf computer hardware and operating systems has improved significantly over the last few years, system failures can and still do occur. A proper redundant OPC architecture can prevent these component failures from leading to loss of control or a disruption of electrical service. In order to ensure the constant operation of their OPC applications, industry leaders turn to OPC vendors and products like MatrikonOPC that provide mission critical redundancy. Power generation, transmission, and distribution utilities provide critical services to people every day. MatrikonOPC and their OPC redundancy products ensure their crucial control data is always available.

Visit http://www.matrikonopc.com for free downloads.

About MatrikonOPC

MatrikonOPC provides equipment data connectivity software based on the OPC standard. The MatrikonOPC promise is to empower customers with reliable data access to all major automation vendors' systems, provide practical OPC training and deliver superior client care. MatrikonOPC builds close relationships with its customers to best address their business and technical needs. With offices in North America, Europe, Asia-Pacific and the Middle East, MatrikonOPC provides local presence on a global scale. MatrikonOPC is a vendor neutral connectivity supplier.

Next Step: Try These Solutions Yourself

MatrikonOPC Redundancy Broker

The OPC Redundancy Broker (ORB) enables easy implementation of redundancy in systems that take advantage of OPC technology. ORB is designed for OPC applications that must use redundant hardware and/or software to achieve the highest degree of communication reliability. ORB can even be retrofitted to current systems since ORB functions with any OPC server, regardless of vendor.

Download Redundancy Broker

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