

WHITE PAPER Redundancy:

How Fail-Safe is your Communication Infrastructure?

English

innovaphone

PURE IP COMMUNICATIONS



GET IN TOUCH

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“Redundancy is the duplication of critical components or functions of a system with the intention of increasing reliability of the system - usually in the form of a backup [...] - or to improve actual system performance.”
(Source: Wikipedia)

Communication is one of the most crucial functional units in a business. It secures the internal flow of information within a business, as much as contact between customers and business partners. Outage of communication may have enormous economic effects on businesses. Even if only parts of the communication system are affected (such as waiting queues or integration of the CRM system), impact on productivity and employee satisfaction may be tremendous.

Selection and conception should always include following aspects:

- Which components are “mission critical”, meaning that failure could jeopardise my business in a worst-case scenario
- Which outages can my business cope with (if there are any at all)
- Which risks need to be considered
 - o Technical malfunctions
 - o Greater forces (such as flooding, fire)
 - o Disturbances with trunk lines and public networks
 - Mechanical influences within and outside of the company building (e.g. damaging of cables during constructions or damage caused by lightning)
 - Communication services supplied by third parties (trunk lines, cloud-based solutions)
- Emergency concepts and resources involved
 - o Is an emergency on-call available that might react?
 - o Does everything need to happen automatically?
 - o What time span is available for emergency concepts (SLA)?
- Which redundancy concepts are offered by manufacturers and integrators?
- Have the implemented solutions been tested, are there objective experiences on reliability and availability
- Who is in charge of supplying redundancy?



Which Components are “Mission Critical”?

Since availability within and outside the company is imperative, one decisive factor to remain available as a company is guaranteed real-time communication.

Opposed to asynchronous media such as e-mail or faxing, where a time delay or disruption during data transmission may be compensated for without the recipient even noticing, real-time communication (audio, video) is very challenging and errors are immediately either heard or seen.

If a company or the authorities are not available via telephone, customers and contacts become dissatisfied. Failure of the communication system is directly linked to the reputation and success of a business. In emergency situations, failure can even become life-threatening.

Yet, a communication system typically consists of different components with varying importance. If it is indispensable to put through calls, you may be able to forego CTI assistance for some time. Most communication solutions have several modules (e.g. Faxserver, CTI, Call Centre, Billing) distributed across different servers which to some extent may have different operating systems and architectures. Some of these services only run centrally, others decentralised, yet without connection to central administration. Put simply: the more heterogeneous the servers of one solution, the more complex the redundancy scenario.

Distinguishing between the services which are utterly necessary and the services which are dispensable for some time being is a critical distinction here. Also, the interfaces to crucial 3rd party systems such as call centre solutions, alarm servers, etc. need special attention, especially in distributed architectures.

This all is simplified if as many services or functions as possible run on one singular platform – as is the case with innovaphone solutions. The redundancy of this one platform then guarantees comprehensive overall functionality rather than merely basic operational functions.

The innovaphone PBX includes all gateway functions concerning connectivity to a public network, complete telephone system functionalities and all necessary components for Unified Communications such as Presence information, CTI functions, Video Conferencing and Application Sharing. Is the innovaphone PBX designed redundantly, all these functions will be maintained in the event of failure.

How much Downtime Can Be Overcome?

By foregoing redundancy for individual components entirely, downtime cannot be defined in case the entire system needs to be set up again with the import of backup data (if these do exist). Are hardware components affected, time for acquisition and delivery of these components will also play a role.

Typically, so-called recovery times are specified with system integrators or suppliers within the scope of SLAs (Service Level Agreements). It is utterly important here to define exactly what is included in the recovery, who is responsible for data backup, also with respect to the extent of data backup.

Even if you have decided for a redundant solution, downtime can still occur, depending on the redundancy concept. With so-called cold standby concepts, redundant components are only activated once the mistake has been noticed. This can cause delays, for example if the activation has to be in-

itiated manually: some time would have already passed between the actual occurrence of the error and the corresponding system startup.

Downtime can be reduced significantly in a hot standby scenario where both systems run parallel: all you need to do is switch from one system to the other in the event of failure. This process usually takes place automatically.

Since innovaphone platforms can easily be connected with each other, redundancy scenarios in hot standby can smoothly be established. In the case of failure, existing connections are merely disconnected to ensure the consistency of databases within networks. Otherwise, all functions are available without interruption and employees usually do not even notice the switch from one system to the other.



Risks to Consider

Technical Issues and Hardware Components

Specific hardware components are necessary for most solutions so that a working system can be set up. This can be specific hardware, traditional computers or server systems. Particularly hardware with loose parts (hard drive, fan) is vulnerable to damage or heat (CPU). Reducing the amount of loose parts and an elimination of power supplies can already improve reliability of components tremendously.

Individual components can be duplicated for purposes of redundancy (mains adapters, CPUs). If you want to double all components, you may want to consider doubling the entire telecommunications system.

The innovaphone gateways form the hardware basis of the innovaphone PBX and have proven their worth on the market with their sturdy components because they do not contain any loose parts. The pricing of innovaphone gateways in connection with the flexible innovaphone license models make it economically feasible for most customers to implement physical redundancy due to cheap standby licenses in addition to the already existing licenses per user.

Events of Greater Forces (Flooding, Fire)

The best solution in events of greater forces such as flooding or fire is the creation of so-called geographic redundancy. The term geographic redundancy describes the fact of setting up duplicated hardware at geographically different locations. Downtime due to local incidents (such as flooding, fire, lightning) can thus be prevented. Even within one single building as opposed to completely different sites of a company, a geographically redundant

scenario can be just as effective as long as certain fire precautions are met. However, connectivity and technical network aspects of the components need to be considered. Only then can users reach the remote component in case of system failure.

Disturbances with Trunk Lines and Public Networks

Time and again, communication is impeded by disruptions that are outside the customer's scope of responsibility. A dredger that cuts through the supply line can cause just as much damage as a technical defect at the switching node of the selected provider. Two supply lines to the building that are geographically separated, appropriately secured lines of the provider or even a two-provider strategy can create additional safety. Depending on the provider, you have to ensure that the allotted block of telephone numbers remains available.

With interconnected infrastructure at different sites, planning must consider how availability of the singular sites remains unchanged, even if the centre is not available anymore. One option to guarantee the highest level of safety is to compose a Master / Slave scenario.

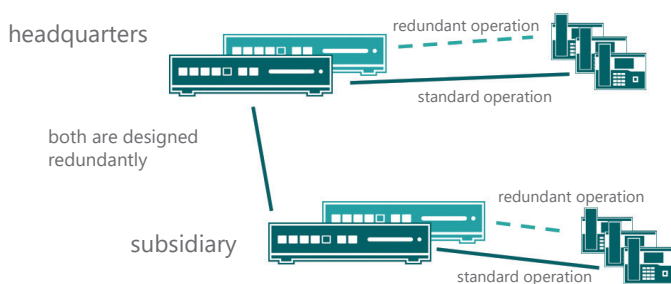
Redundancy with Master / Slave Systems

Of course, it is possible to simply duplicate every single component of a communication solution. You must be aware of the fact that a lot of components (the redundant parts) will only be used on rare occasions. Therefore, it is economically more sensible to realise redundancy with other, equal components within a network, where these com-

ponents are typically also active. Further, if failures such as described above occur, branches can continue with their daily business. IP telephone systems have different realisable redundancy concepts. Three of these concepts will be described here.

Option 1:

The headquarters have a communication system (Master) and a subsidiary. This subsidiary with its own communication system (Slave) is connected to the headquarters. Initially, every single system can be built redundantly. If an outage occurs, telephones can easily register at the redundant system.

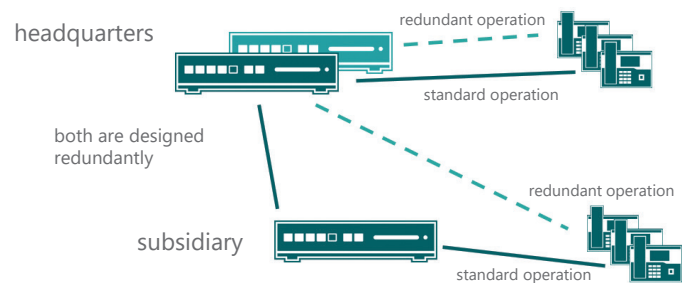
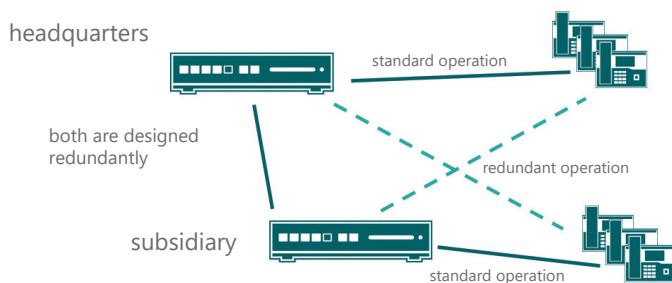


Option 2:

Instead of having a system at the headquarters and the subsidiary each, the system at the headquarters can be configured as a redundancy system for the subsidiary, as long as there is enough space. The same works vice versa but the system of the subsidiary must be set up in a way that all the workload of the headquarters can be handled.

Option 3:

If you assume that the system at the headquarters has significantly more users than the subsidiary, then it may be sensible to install a physical redundancy system, meaning the combination of both systems.



Opposed to other manufacturers, innovaphone systems can realise all three redundancy scenarios. With the Master / Slave concept in an innovaphone network, all business areas can be equipped so that they remain independently

operational with all their functionalities. If the branches are equipped with a separate trunk line, availability (incoming and outbound) is ensured. This is also extremely significant for the possibility of making emergency calls.

Other Redundancy Concepts and Options

The above-mentioned redundancy concepts and scenarios can be combined and expanded individually, depending on the requirements. Additionally, there are many other options. Two of these options shall be described in the following.

Virtualization

Virtualized environments offer the advantage that the different systems have a large range of deployment (functional range) on standardised EDP hardware. The virtualization environment (e.g. VMWare or Hyper V) in turn offer their own mechanisms so that high availability is provided and different systems can be administered.

Switching to a further instance usually occurs within split seconds without loss of data. It is important to ensure that the solutions implemented on the virtual platform support the corresponding HA (High Availability) mechanisms.

Cloud Solutions

Cloud solutions advertise with high availability and a reduction of operating expenses. It can be assumed that reliable providers of cloud platforms take the right precautions in order to achieve highest possible failure safety. Oftentimes, certain measures are more complex and qualitatively higher than singular businesses could ever afford because all investments can be redistributed onto many more customers and users. So, all parties can profit from these technologies.

Despite the already high security precautions there are also solutions offered with which local redundancy may provide either basic functions or complete functionality. A component can be installed

onsite which manages local communication, in addition to using the local trunk line if the cloud connection were to fail. Then again, there are providers which reverse the procedure: they offer their cloud infrastructure as redundancy for local installations.

innovaphone as the equipper of cloud platforms for numerous service providers does not only offer extensive UC functionalities for all users. With the above-mentioned possibilities all security needs of the customer can be satisfied with a customer-focused combination of exactly these possibilities – be it a specially secured system within the cloud or be it the provision of local gateways as local redundancy.

Summary

In this day and age, real-time communication is one key factor for most businesses and pivotal to economic success. Depending on the dangers, risks, and also depending on the technical equipment in addition to the budget, there are numerous alternatives which make a system fail-safe.

innovaphone proves on a daily basis with many renowned customers that secure and reliable communication is feasible – with manageable technical and financial effort.

CHECKLIST

for a Stable Communications System

As an aid for your planning, you can use this checklist for a secure communication solution:

What failure scenarios need to be considered:

- Fire / Flooding
- External Damage (supply to the building)
- Overheating
- Power outage -> duration
- Technical damage with servers or other components

What technical systems / redundancies need to be planned:

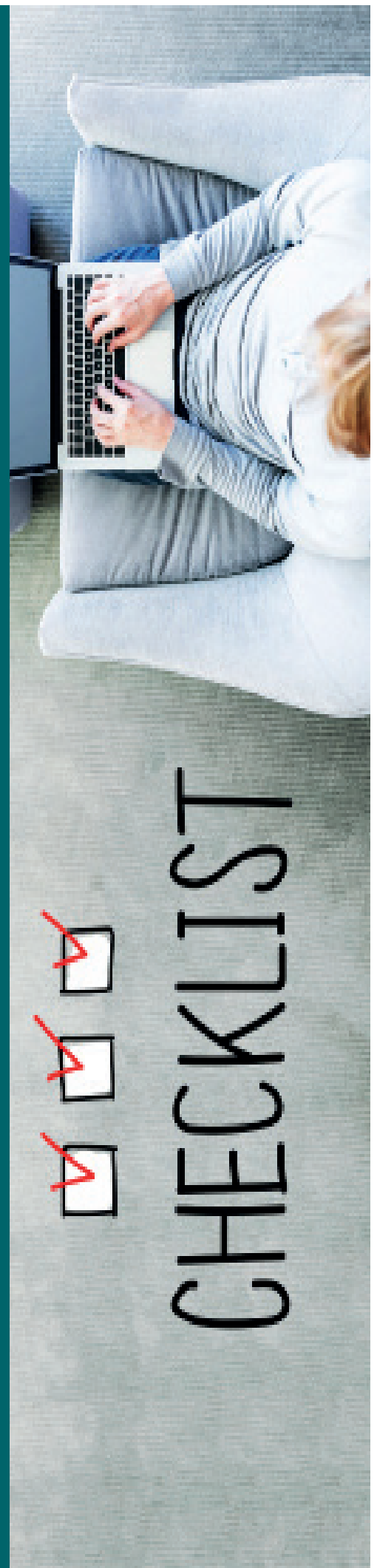
- Power supply
 - o UPS (uninterruptible power supply)
 - o Second power supply
- CPU
- Hard drives / duplication / automated backup
- Network cards / switches / router
- Redundancy via virtualization (HA / FT)
- Duplication of system
 - o Hot / cold standby
 - o What downtime / switchover time must be expected
 - o What exactly happens once redundancy takes over

What communication services need to function at all times / need to be secured (backup)

- Basic telephony: internal / incoming / outbound
- Emergency calls
- Operator desk
- Call centre / contact centre / hotline
 - o Telephony / Chat / E-mail
- CTI / dialing help
- Video communication
- Application Sharing
- CRM
- ERP
- Trouble ticket system
- Alerting systems
- other

How does monitoring of the components / alerting take place

- Network monitoring
- Alerts
- SNMP
- Alarm / Event mail notification
- Logging of configuration changes



INNOVAPHONE

**...is “Pure IP Communications made in Germany”
– and has been from the very beginning.**

Since innovaphone AG was founded in 1997, the company has been specialising in the development and manufacture of pure IP communication systems. This extensive experience and intensive engineering work makes the innovaphone PBX a unique, sophisticated IP Telephony and Unified Communications solution – also from the cloud.

...is still a “real owner-managed medium-sized enterprise”.

The technology company is entirely owner-financed with the partners forming the management team. This shareholder structure has had and indeed still has a lasting effect in establishing the internationally oriented, independent company as a reliable partner in the European market.



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