WHITE PAPER ALL IP

Switching from ISDN to All IP

innovaphone

PURE IP COMMUNICATIONS
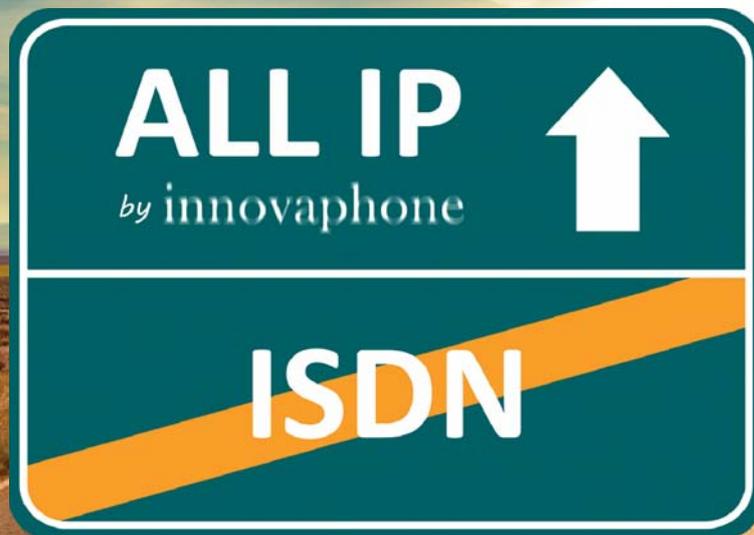
WHAT IS "All IP"?

"IP" is the abbreviation for "internet protocol" and the description for a network protocol in data networks. For more than a decade, the different services such as mobile telephony, internet and TV, as much as entirely new technologies (think of the "smart home") have been converging into one network. The common language of this network is the internet protocol. Solely telephony has not completely been switched to the new packet-oriented network, the so-called "next generation network". As a result, two different network structures have been operating in parallel for a long time, causing higher costs, also for maintenance. Logically, "Voice over IP" indicates the switch of voice, including telephony, to the uniform internet protocol, in addition to the already IP based services. We speak of "All IP" in context with full migration of all channels to a packet-switched, fully convergent network infrastructure. In addition to tremendous economic benefits, a unified network infrastructure also brings along entirely new technological possibilities which shall be described in more detail below.

Initially, companies are confronted with additional costs and considerable technical effort once the switch to All IP is pending. However, companies are ultimately left with no other choice since ISDN lines will simply cease to exist in the future. Yet, several options are available to convert from ISDN to All IP. Good consultation and planning are essential to develop a migration plan optimally suitable for the individual companies.

Early Birds and Late Risers: Migration to All IP Across Europe

Quite similar to the comprehensive switch from analogue lines to ISDN across Germany in the 1990s, once again an era is coming to an end: the transition to internet protocol (IP) is taking place across Europe. Providers are steadily discontinuing the existing ISDN connections and starting All IP campaigns, for example "Adieu RTC" in France, "Bye-bye PSTN" in the UK or "Het einde van ISDN" in the Netherlands. The goal is to switch the very last garrison of communication, namely telephony, to the unified internet protocol, after media channels such as the internet, mobile telephony and TV are already commonly based on "All IP". The pace of the IP transition differs quite a bit, depending on the country. While some smaller countries like Macedonia, Slovakia and Croatia have already switched, British Telecom (BT) assumes the switch to be completed in the UK by 2025. (http://www.lightreading.com/ethernet-ip/does-bt-lag-european-peers-on-all-ip/a/d-id/716849) .

One large telecom provider in Belgium, Proximus, has announced that all data transmission shall take place via IP network by the end of 2018. The Dutch telecommunications company KPN is the largest provider in the Netherlands and does not want to provide anymore ISDN connections after September 1st, 2019. In France, all metropolitan areas shall be switched to All IP by the last quarter of 2018. Spain, on the other hand, does not share the European tendency to switch off ISDN altogether.

Yet, Spain is a pioneer with the expansion of fibre optic cabling so that once the switch to All IP shall be carried out, the country will definitely be well-prepared and have a great technological basis for the switch.

In Germany, Austria and Switzerland, migration to All IP is currently in full progress. The German Telekom has also set the goal to switch all its connections in Germany to All IP by the end of 2018.

Yet, things look quite different with Vodafone: the provider wants to grant its business customers more time by keeping ISDN connections until the year 2022 and even beyond that target date, if deemed necessary. Smaller providers such as "Vereinigte Stadtwerke (Public Utilities)" also continue to offer ISDN services with certain service packages ("media tel ISDN") for specific regions.

Swisscom is one of the largest providers in Switzerland and announced the entire dissolution of the old infrastructure with the complete migration to All IP for 2018. Austria was one of the very first countries to begin with the transition of the networks. The Austrian provider A1 took the lead in the year 2014. Nonetheless, the transition in Austria is far from being completed, just as in Germany.

What New Possibilities Open Up with an All IP Solution?

Before looking at the advantages - and possibly also the disadvantages – of switching from ISDN to All IP, we need to keep in mind that there simply are no alternatives available. Instead of creating an "either / or" scenario, it makes more sense to perform the technological transition in a manner that maximises the benefits and minimises the disadvantages. Generally, All IP connections bring about following benefits for companies:

1. Greater mobility since users can work irrespective of their current location: an employee can be in the office, visiting a customer or waiting at the airport: as long as there is broadband access, the employee will be available with one single landline office number, no matter whether using a fixed line telephone or a smartphone. Being able to use individual numbers "on the go" with All IP solutions enhances the availability of employees and consequently also work efficiency.

2. Flexibility due to unlimited expandability of voice channels: with ISDN lines, the number of available voice channels is determined right from the start. A BRI connection (Basic Rate Interface or Basic Rate Access) provides two voice channels, one PRI connection (Primary Rate Interface) enables simultaneous calls on 30 voice channels. In these scenarios, the responsible IT department always had to determine in advance how many voice channels needed to be made available for a site or a branch. This does not apply to an All IP connection anymore since it is theoretically possible to make flexible upward and downward adjustments. Further SIP channels can be booked additionally. The only technical prerequisite is the bandwidth of the connection. This factor and the amount of telephone numbers a provider allocates stipulate how many calls can run in parallel. Further, SIP trunks can be provided either via fibre optics, via DSL or WLL (Wireless Local Loop) so that the type of internet connection does not matter.

3. Making the best of the switch with new features such as Conferencing, Presence and others: companies are able to introduce new applications when switching to All IP. These new applications may not have been technically feasible if the switch had not taken place. With employees being available at their fixed phone number, also when they are on the go, completely new communication possibilities open up: telephone or video conferences can be started without effort, Collaboration and Application Sharing are easily possible. Working across departments and borders is simplified and efficiency of larger teams is significantly optimised.

4. Expenses: irrespective of whether companies used to have a BRI or a PRI connection, fixed costs always applied to the number of lines provided. This is not the case with All IP: most SIP trunk providers offer graded packages with low monthly fees.

5. Full virtualization is possible – All IP with the cloud: one elementary advantage of the switch to All IP is the possibility to opt for a cloud solution. Whether you would rather keep control of your own IT in-house or have it outsourced, this is ultimately a matter of preference. Both approaches hold chances, as well as risks. You will be on the safe side if you opt for a manufacturer that offers a solution with both technical options. This enables you to switch from a solution on your company premises to cloud and vice versa, or you will be able to combine both.

The Steps of a
Successful Transition to All IP

Private users typically do not notice ISDN deactivation and the switch to IP technology. However, companies are required to approach the topic of technological change and to develop a clear strategy in order to master the transition without encountering major challenges.

The very first step is to decide on whether you would like to keep to a solution on your premises or whether you are contemplating to outsource telephony into the cloud. Both approaches offer advantages and disadvantages. The most notable advantage of a cloud solution is the fact that you will have huge savings with the in-house IT department concerning effort and expenses.

Yet, it may be a big step to partially relinquish the control over the own IT infrastructure. Especially with the GDPR (General Data Protection Regulation), companies must make sure that all guidelines there-

of are also met if the communication infrastructure is outsourced to the cloud. Generally, benefits and quality of a cloud solution highly depend on the individual providers and their solutions offered.

Recommendation: Cloud

Once companies opt to outsource their communication infrastructure into the cloud, they will be on the safe side if they choose a manufacturer that offers both, solutions on the company premises and cloud solutions.

This approach has two advantages: for one, employees need not adjust to new software and new end devices: Everything will „look and feel" the same. Additionally, companies remain flexible since they can always switch from one model to the other.

Once the company has come to the decision that the communication infrastructure shall be modernised, following steps need to be considered when switching to All IP:

Selecting the Provider and Dimensioning of the Connection:
If you used to have an analogue or ISDN connection, you may now ask yourself which SIP provider you will need in the future. When opting for a SIP provider, it is a good idea to examine carefully what different trunk lines and characteristics are offered via SIP. The very first provider coming along your way is typically not the best solution and offers vary considerably when it comes to the type of connection, rates and rate details. If the decision has fallen upon an independent solution which allows for unrestricted choice of the SIP trunk, you will not expose yourself to long-term dependency of a certain SIP provider.

Following criteria should be considered when selecting a provider:
• Can the SIP provider offer his services at my location or locations?

• Are dedicated internet lines of the SIP provider necessary and also technically feasible?

• What security mechanisms does the provider supply? Does the SIP provider have his own dedicated trunk connections or is he attached via conventional internet connections? Does the SIP provider support encryption towards trunk? Is an SBC (Session Border Controller) included in the offer? (In this context, you may want to consider that an SBC may not be necessary or may already be included in the product, depending on the manufacturer). Does the SIP provider offer different scenarios on redundancy such as multiple connections or fallback? Which codecs are supported by the provider (e.g. G.711A, G.711U, G.729, G.722, Opus, T.38 and more)?

When setting the dimensions for the SIP connections, you generally are more flexible than with the old, predecessing technology: ISDN connections used to offer Primary Multiplex Access with 30 channels or basic ISDN connections with two channels. These were then connected to the telecommunications system via specific gateways or ISDN cards. There are one or more SIP trunks for SIP that are connected over an existing data line or a dedicated data line of the provider. All voice channels are directed over this and scalability is basically unlimited.

One additional consideration should be whether the necessary bandwidth for an All IP connection is provided. This ultimately also depends on the codec used for compression. Usually, the codec G.711 is supported by the SIP providers and used to connect the telecommunications system to the trunk line. A rough estimate for the needed bandwidth at G.711 is following value: "100 – 120 kbits/s for a call encoded with G.711."

Smooth Migration or New Telecommunications System?

Entering the world of All IP can either occur immediately and completely or step by step. With the first scenario, the existing telecommunications system is entirely replaced by an IP capable system. The second scenario uses a VoIP gateway that is installed between the classic telecommunications system and the existing ISDN line. For one, this realises the connection to the SIP provider, and also enables the continued use by integrating existing analogue devices such as door openers or faxing via an analogue adapter. This gradual introduction with several steps of innovation and a pace that can be selected individually has the advantage that the initial investment is limited to a VoIP gateway and manageable. Further, no intervention in the existing telecommunications system is necessary. Especially smaller and mid-sized companies that would like to gain some experience in the world of All IP opt for this "smooth migration" rather than having a radical break in their communication structure.

Ideally, the product range of the VoIP gateway manufacturer enables a completely flexible re-structuring of the communication infrastructure: for one, there is the option of "smooth migration", and also the option to upgrade the already existing VoIP gateway to a complete telephone system and Unified Communications solution. Only in this case will full investment protection be granted.

Recommendation: Smooth Migration

The benefits of smooth migration are quite obvious: project phases during transition can be chosen individually, no breakdown of the communication infrastructure and full investment protection.

When choosing a manufacturer, emphasis should be placed on the fact that the VoIP gateways which are used to link the old telephone system with the IP network should simultaneously also offer the technical platform for a new communication system with Unified Communications or, going one step further, for App functionalities.

This enables companies to remain fully flexible with respect to further modernisation of their business communication.

When Is It Recommendable to Install a New Telecommunications System and What Should Be Considered?

You should consider a new telephony solution if it makes sense economically. The time may come if the end of the lease for the existing system has been reached, if the maintenance contract comes to an end, or if there is no service partner for the existing system. Further proof in favour of a new telecommunications system may also be the desire to be able to make use of more modern applications.

When replacing a conventional system, it is important to clearly define what the expectations are of the VoIP system. Following points should be considered:

• What is the scope of service with the existing system? What scope of service shall the new system have?

• What other devices are connected to the telecommunications system (such as alarm servers, fire alarm systems, elevators, franking machines, card readers and others) and what connectivity possibilities does the new system offer?

• Shall every single analogue device be replaced by an IP enabled device or shall "smooth migration" be the way of choice by connecting analogue adapters?

• What about fax integration: with real-time voice communication via the internet, packet loss is accepted since it may partially be imperceptible. Also, minor losses may be compensated for by the human brain. This does not apply with fax-to-mail since packet loss or delayed data transmission may result in incomplete data transmission or in a complete breakdown. One possibility to prevent this is the use of a T.38 protocol when sending faxes. When selecting a manufacturer, it is advisable to pay attention to the fact that T.38 is supported.

• Security: the security aspect plays an important role when switching to All IP since it is inevitable to open up every PBX to the internet. Therefore, it is important to select a manufacturer that implements all relevant security protocols such as ICE, STUN or DTLS into the solution.

Recommendation: Integration of Analogue Devices

Especially the integration of analogue devices critical to safety such as alarm servers, fire alarm systems, elevators or card readers into the IP infrastructure pose particular technical challenges. Also, in events of power shortage, these devices must be singalled reliably. It is necessary to ensure appropriate protection of the essential infrastructure (switch, firewall, router, etc.).

Alternatively, it may make sense to consider a signalling of these personalised alarms via GSM. This should be discussed in advance with the relevant providers of the alarm solution. It is also worth a thought to convert franking machines or card readers to IP right away. The selected manufacturer should also offer analogue adapters for the integration of analogue devices in his portfolio. Fax integration should further be supported by the standard T.38 which guarantees stable fax connections over IP.

What Are the Requirements of the New Telecommunication Solution:
Pure Telephony? Unified Communications System? App Platform?

Business communication has undergone some drastic changes over the past twenty years and the requirements for a telecommunications system have been completely redefined. However, the requirements for a telecommunication system do vary from business to business and from branch to branch.

There are still companies that place utmost emphasis on traditional telephony and that want to remain using functions that have become dear over the years. These may include: secretary functions, answering machines, voicemail, call diversion, callback when busy. However, these functions shall now be supplied via IP instead of via ISDN. These companies really need to make sure that the new telephone systems are no deceptive packages when opting for a manufacturer: not all new IP based telecommunications systems deliver what is promised at first sight: some manufacturers have traditional telephony features only partially implemented into the new telecommunications systems. As a matter of fact, neither employees nor IT departments will be satisfied if familiar telephony functions can no longer be made available.

Recommendation: Telephony Functions

You may find major differences when it comes to telephony: in some companies and at some workplaces, the emphasis is placed on traditional telephony with applications everybody is accustomed to. Other companies particularly emphasise the integration of mobile end devices. Yet other companies need special devices, for example in production areas.

It is sensible to choose a manufacturer that offers a broad range in its product portfolio, covering traditional, over decades approved telephony functions in addition to new applications. High telephony comfort and intuitive operation are also essential aspects.

Other companies have a variety of different requirements, depending on the individual workplace. There may be employees working on production areas that need sturdy end devices with regular telephony functions and others that work in administration departments of companies which need functionalities such as Video Conferencing or Chat. Then, there may be departments that would like to make use of the entire spectrum of what modern Unified Communications applications have to offer. So, when opting for a new IP telecommunication solution, it should be considered that UC functions can be added individually for every single workplace. This will help keep the costs for UC licenses at bay.

A third group that is quite small right now but will definitely be growing fast in future are companies that would like a modern app platform that does not seem to have much in common with a conventional and familiar PBX at first glance. In this case, functions such as Application Sharing, Federation and Mobility are the most crucial factors. These companies typically are globally active and have offices at different locations so that a flawless exchange of information across geographically separated sites is paramount. Here, telephony is one of many functions while these other functions can only actually be technically realised with the switch from ISDN to IP.

Recommendation: UC Licenses

Having a license model that grants flexibility is a decisive factor when selecting a manufacturer:

In addition to hardware and software licenses, also Unified Communications licenses such as Video, Application Sharing or Voicemail should be activated according to the needs and individual requirements. Further, a clear and structured license management and transparent billing should also be provided.

Conferencing

Video

MOST IMPORTANT ASPECTS OF THE NEW IP SOLUTION:

- The selected solution should offer the opportunity to be operated both in the cloud or on company premises so that full flexibility can be granted at any time

- In addition to the various modern UC applications, traditional telephony features should also be covered by the new system

- All relevant security protocols should be implemented into the PBX

- Smooth migration should be an option so that transition to the new system can proceed in several project phases and without system failure

- The option should be given that Unified Communications applications can be booked flexibly for every workstation and without needing to make major adjustments to the infrastructure

- Unified software for all company sites should be provided for, irregardless of their size
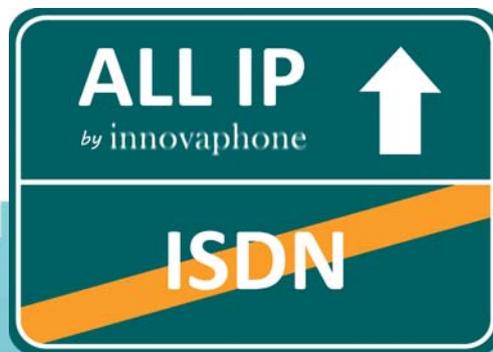
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...is "Pure IP Communications made in Germany" – and has been from the very beginning.

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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