ITdental PRIME COMPUTER

THE CONNECTED PRACTICE

GUIDELINES FOR THE DIGITIZATION OF A PRACTICE

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1. THE PATH TO A CONNECTED DENTAL PRACTICE

Whether for patient billing and communication, documentation, the creation of a treatment plan or practice administration - the computer is in use throughout medical and dental practices. Regardless of whether you are starting a new practice, extending an existing practice, or taking one over, it is important to consider the role of computer technology, and the long-term value it can deliver.

Through our work with medical and dental practices, and the IT services organisations that support them, an assessment of the practice needs to be undertaken:

- To ascertain their priorities and objectives
- Analyse existing, and define new, work processes
- Identify the financial and non-financial benefits that will be achieved, and
- Define the IT Infrastructure that needs to be implemented to realise these benefits.

The objective of this document is to introduce the services that existing Prime Computer resellers provide to medical and dental practices in delivering a 'Connected Practice'.

2. DETERMINING THEIR REQUIREMENTS

Every practice has special, individual, requirements that also have a direct impact on their IT infrastructure. There are several factors that determine what shape the computer network will take:

- **Size**
  The number of employees is an important factor. Especially the number of computers which must always be active, as this is a factor in defining the required performance of the server and network.

- **Growth**
  Practices become larger, which ultimately affects the requirements of the computer network. When planning, it is therefore important to focus on scalability to be able to meet future requirements. A degree of flexibility in the system is therefore necessary - individual components should be exchangeable or upgradeable without great effort.

- **Data**
  What type of data is being processed and, above all, what is the expected volume? What is being digitised - digital archiving of old files and other documents, or are X-rays also being considered? The more demanding the digitisation requirements, the greater the demand on individual client computers.

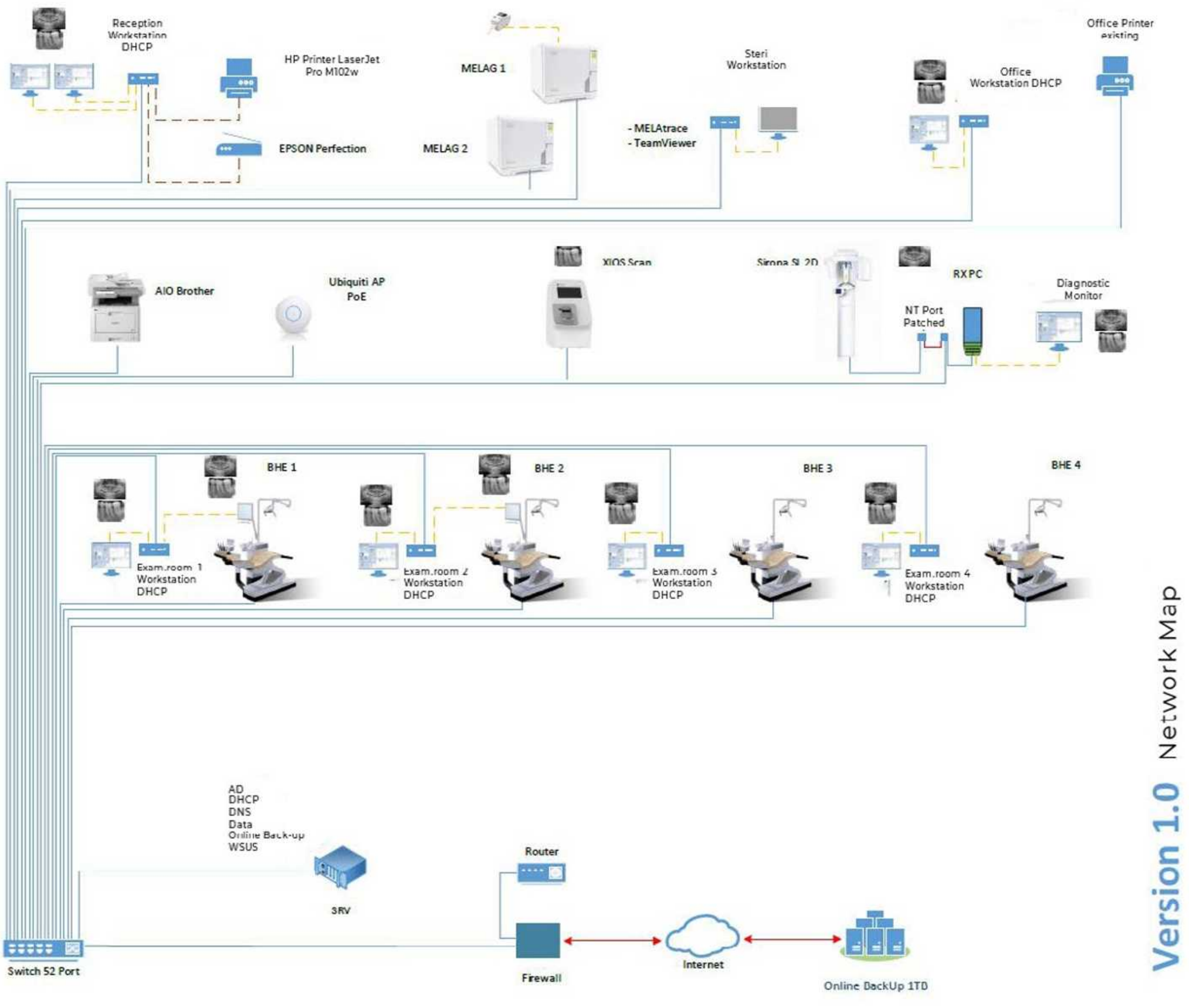
- **Necessary software solutions**
  Which data processing systems are used? Office and the respective operating systems have rather low system requirements, while specialized software, such as X-ray software, require additional computing power.

- **Budget**
  Different practices not only have different IT infrastructure requirements, but also different budgets. Depending on the shape and complexity of the IT infrastructure, the total costs can vary.

3. PLANNING / NETWORK

Communication technology has been developing rapidly, and there is no end in sight to this development. In addition, the needs are changing and the demands on the network are increasing.

A well-planned and structured network supports the daily work processes in every practice. Modern, sensibly planned communication channels support a modern, cost-effective, and smooth way of working. The common basis for this is the structured cabling.



3.1 Why is a structured network configuration so important?

Maintaining an on-premises infrastructure is not an entirely trivial exercise, especially since the maintenance and scalability of the systems must be continually considered. Therefore, both careful planning of the individual components in the network and a clean implementation are important. The maintenance and servicing of IT systems is much easier when the entire structure is clearly documented and labelled.

- All computers, servers, switches, cables, and patch panels should be labelled accordingly.
- Documentation of the network structure, in which the marking designations get tracked.
- Network ID connected devices and IP address should ideally be legible on labels.

3.2 Cable remains the connection of choice

There are three technologies to choose from when connecting the computers:

1. Cable
2. Funk
3. Power grid

Wherever possible, network cables laid in cable ducts or concealed are the best choices. Three criteria determine the quality of the cables:

1. The transmission speed
2. The transfer volume
3. The shield against sources of interference

The shielded CAT7 offers the highest standard, and this is what our resellers recommend to practices. Fiber optic cables achieve the best scores in all three categories, but require special hardware (or adapters). But regardless of what you choose to recommend, our opinion is that the practice should not try to save money on cables. The invisible weaknesses of a bad cable results in errors, which must be compensated for by the software and this reduces the performance of the entire network.

- **LAN cable with CAT7 standard**
  The CAT7 standard represents the highest standard for LAN cables. In medical and dental practices fast and reliable connections between the individual computers must be ensured, which is why the CAT7 standard is mandatory in practices. A frequency of almost 1 GHz can be achieved here.

3.3 Radio and electricity can also be used

If, due to structural difficulties, it is not possible or only possible with great effort to lay the cables for a LAN, a WLAN with modern security methods is the alternative that our resellers recommend.

Where a radio network is used, possibly in combination with a wired network, all available security mechanisms must be deployed.

This includes both WPA2 encryption and the deactivation of the automatic connection to every available WLAN. All devices must be configured in such a way that a connection is only possible to pre-set WLAN installations.

3.4 WLAN encryption: WEP, WPA & WPA2 explained

- **WPA2 (CCMP) High**
  We recommend that this mode should always be used as encryption, because it is the latest and safest. If some WiFi devices do not work with it, the next mode should be considered.
- **WPA + WPA2 High**
  This mode should be selected if the WLAN devices only support WPA (TKIP). Then the router will use WPA for these devices and the better WPA2 for all others.
- **WPA (TKIP) High**
  We do not recommend for medical and dental practices.
- **WEP Gering**
  We do not recommend for medical and dental practices.

When our partners are retrofitting a practice, they consider the use of carrier frequency systems, such as Powerline or PLC. They provide the network functionalities via the mains socket, into which a corresponding adapter is plugged in. So that the data via the power grid does not fall into the wrong hands, the data traffic is encrypted and only adapters registered in the network have access to the network. However, we do advise to have the quality of the cables tested in advance by an electrician.

→ The network of the dental practice Eggli in Utzensdorf, Switzerland was realised with Powerline adapters.

4. FOR FAST DATA TRANSFER: A POWERFUL SWITCH

What is the point if server and client performance are impacted by a slow network?
A fast network connection is mandatory. The following applies to the server: at least 1 gigabit, depending on the size up to 10 gigabits. The clients should also be connected to a gigabit network. So that everyone can communicate with each other, the network distributor must be suitable. This should have fast connections so that the clients and the server can utilize their full range of services.

4.1 Connection of several Ethernet switches

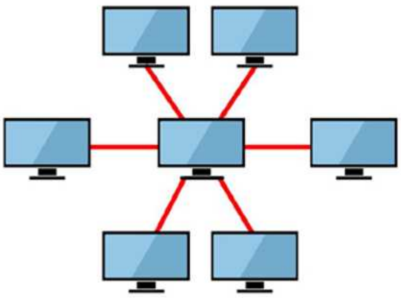
Digitization means that more and more medical and dental devices are network compatible. As an example, sterilizers, thermal disinfectors, intraoral scanners are just a few of the devices that have a network connection in dentistry, but what if there are not enough network connections? If several switches (Smart Switches) are connected in series, only switches from the same manufacturer, and of the same type, should be used to rule out possible sources of error.

5. BUILDING WIRING

The network cabling in the building itself must not be forgotten. This must be installed by an electrician if no “usable” cabling is available. Since the planning of the lines in new practices should be well thought out, this is a service our IT service partners provide. A joint decision is then made as to where, how many, and what types of network cables and network connections, as well as sockets, must be present in each room.

Ideally the practice should have a dedicated technical room. Such a node is useful to save costs for additional cabling. Many practices have limited “storage space”. Therefore, we recommend that general storage rooms or consumable/materials storage rooms be considered as doubling up as a „technical room“. This is entirely possible, but a lockable rack (server cabinet) should always be considered and protect the technology against theft and manipulation.

5.2 The most common network structure in a dental practice

Star topology	**Advantages and disadvantages**	
 All participants are connected via a central participant.	No active network components necessary (passive)	YES
	Continues to function in case of participant failure (redundancy)	YES, unless the central participant fails.
	Continues to function when the number of participants is increased/reduced (easy maintenance)	YES
	Data is relatively tap-proof	YES
	Duration of message transmission	Short (for switch use)

6. THE SERVER, THE BRAIN OF A NETWORK

Depending on the location of the practice, it is still common today to only have one computer at reception. However, since more and more devices can be digitally integrated, the trend is clearly towards networked solutions.

The “heart” of the network is at least one specialized computer, the server. The software products (also known as server services) that are to be available to the connected computers (clients) - for example, the practice management software and the database - are installed on this computer. To ensure the performance and service life of the server it should be well protected, inaccessible to unauthorized persons and secured with an uninterruptible power supply (UPS).

6.1 Clarify key data: How much memory is required on the server?

The size of the hard drive and other components depends on the individual requirements. Particularly with x-rays - especially with 3D x-rays - individual files can contain several hundred megabytes. There is no rule of thumb for calculating the memory, but the average number of X-rays gives a clue. For the calculation of the storage capacity, the server operating system, the practice software, updates for personal drives and general storage, as well internal backup must be considered.

For the server and clients, the components are now selected, e.g. the size of the main memory, the number of processors (i.e. the central processing units) and their performance. Should a virtual machine (= simulation of a computer system) run on the server? Are there any special graphics that must be taken over by the server or the client? This requires precise advice and coordination between the software manufacturer and IT service provider.

6.2 Recommendation: Server

Like all Prime Computer products, the PrimeServer Pro is fanless and designed for durability, reliability, and easy maintenance, resulting in a low cost of ownership, and allowing the practice to reduce their carbon footprint. The PrimeServer Pro offers the common features of a conventional server, but the fanless design also has very special advantages. The PrimeServer Pro is significantly more reliable than conventional servers when used in medical and dental practices.

Benefits:

- Silent, dirt and dust resistant
- High hygiene standard
- Reliable and fail-safe
- Low power consumption
- Scalable
- Redundant power supply
- Developed and manufactured in Switzerland
- 5-year guarantee

Link to product

6.3 Recommendation: Client PC

Thanks to the fanless design, the PrimeMini 5 desktop PCs are completely silent and resistant to dirt and dust. This allows use in environments where conventional PCs reach their limits. For example, directly in medical treatment, or examination rooms.

[Link to product]

Benefits:

- Silent, dirt and dust resistant
- High hygiene standard
- Reliable and fail-safe
- Very low power consumption
- Scalable
- With or without Windows operating system
- Without unnecessary garbage software
- 2x HDMI 2.0a for 4K resolution
- Available with Intel i7 and i5 processors
- Developed and manufactured in Switzerland
- 5-year guarantee

7. SECURE DATA, VERY SECURE

Patient trust is the capital of every practice. In the age of increasing digitization, no compromises can be made with regard to confidentiality. Every network, in which confidential patient data is stored, therefore needs rules in order not to impact the patient-doctor relationship.

7.1 Backup

We are now all aware of the encryption Trojans (also known as "ransom Trojans"), which encrypt files on the victim's computer, and on connected network drives, and thus render them unusable. The landscape of extortion malware is constantly expanding. The current versions have a much greater damage potential than just blocking the screen without damaging data. Infected e-mails and hacked websites are the main gateways for such encryption Trojans. To protect the data from such attacks, it is important:

- Regularly make a backup copy of the data.
- The backup copy should be saved offline, i.e. on an external medium such as an external

hard drive

- The medium on which the backup copy was created must be disconnected from the computer after the backup process. Otherwise, in the event of an attack by ransomware, the data on the backup medium will also be encrypted and rendered unusable. Use a second, spatially separate online backup, which also backs up at regular intervals.

7.2 Firewall

For data protection reasons, every medical and dental practice is obliged to protect patient data against external attacks. Antivirus software protects the file system from unwanted programs, while a firewall is primarily there to prevent attackers or external threats from gaining access to practice systems. A firewall is only safe if it is maintained, that means:

- Regular installation of updates
- Monitor the logs

7.3 Antivirus

Antivirus software scans data, such as websites, files, software, and apps, that are transmitted to practice devices over a network. It looks for known online threats and monitors the behaviour of all programs, reporting suspicious behaviour or malicious code. It tries to block or remove malware as quickly as possible. We recommend that practices:

- Always use the latest version of virus protection
- If you are using virus protection that is subject to a fee, make sure that you renew your subscription for an additional year.

7.4 Patch management (updates)

For every medical and dental practice, regardless of its size, patch management should have a permanent place in the digitization strategy. Patching is essential for safety and for clean work. In most cases, however, there is simply no knowledge of what, when and how to patch. To keep all systems up to date in terms of security and stability, it is important to know the systems and processes. Different patches or updates must be classified and rolled out differently.

- The operating systems as well as all applications and drivers installed on the computers must be consistently kept up to date.

7.5 Security Awareness

Why security awareness? Quite simply, prevention is better than aftercare - your employees are a far underestimated risk factor. Because cyber criminals mercilessly exploit ignorance and good faith. Often, human error forms the basis of the attack. Unfortunately, attacks that can be traced back to human error can only partially be prevented with technical measures. This makes it more important to regularly train employees to make them aware of the problem and thus minimize the risk of a cyber-attack.

- We recommend that you conduct the training in the familiar environment of your practice.

7.6 Is an iMac Immune to Viruses?

The number of malicious programs for Mac devices has increased rapidly in recent years. Although MacOS already has some built-in security functions that, similar to Windows, are intended to prevent the installation of programs from dubious sources, attacks via subsequently installed browsers and browser extensions such as Flash and Java represent a security risk that is usually underestimated.

8. UNDERSTAND DIGITALIZATION AS AN OPPORTUNITY

Digitization is not just about digitized processes, but also about the implementation of digital innovations. Prime Computer partners support their medical and dental practice clients in understanding this as an opportunity and the resulting benefits. Because the digitization of business processes, and the development of digital business models, create economic added value at all business levels. Smaller practices often react hesitantly to changes due to digitization and have some catching up to do when it comes to adapting working methods and processes.

The author

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Translated by Prime Computer AG