



# Non-Proprietary Performance Description of Notebooks

Guide

Version 1.0

## ■ Impressum

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# 1 Introduction

This guide was created as a result of a working group led by **German Ministry of the Interior's Procurement Office, and the Bundesverband Informationstechnik, Telekommunikation und neue Medien e.V. (Federal Association of Information Technology, Telecommunications and New Media - BITKOM)**.

The aim of this website is to give authorities support for wording in official tenders for the procurement of information and communications technologies in a non-proprietary manner, i.e. in a way that avoids the use of proprietary brand names or referring to specific manufacturers, while taking state-of-art technical requirements into consideration. In the scope of this Guide, Desktop PCs refers to computers at the work place of various performance classes. Future versions of this guide will take notebooks, server and other ICT products of various types into account.

Both European and German law forbids the use of brand names in the scope of public tenders. This is a consequence of European anti-discrimination policy pursuant to the framework of the 93/36/EEC Council Directive from 14th June 1993, and implemented as Section 8 VOL/A; it is designed to guarantee that certain manufacturers or vendor's are precluded as potential bidders due to discriminatory wording. Exceptions can be made for cases in which the description of performance is impossible using sufficiently precise, generally understandable terms. However, in this case, the description must be supplemented by the words "or equivalent".

Wording documents for official tenders is not an easy task, especially not in the field of procurement of information and communications technology (ICT): the technical complexity of the material, the quick succession of product cycles, and above all the problem of describing the required system performance in a precise manner taking all of your technical requirements into consideration are often a major challenge to purchasers in public

offices. This is why product and service descriptions have often relied on well-known proprietary product names.

This is precisely the point on which the guide focuses by offering a compact tool to ensure compliance with legal requirements and thus ensure fair competition, and to identify and describe state-of-art technical standards. To fulfill legal requirements, this approach leverages general accepted **benchmarks** as a major element of a non-proprietary product description. **Technical requirements and standards** are described in a compact tabular format. To keep the guide up to date, it will be revised at regular intervals. Revisions will take the latest technical developments into consideration and adapt benchmarks to reflect the current state-of-art.

This document relied heavily on intensive cooperation by the members of the "Non-proprietary product performance descriptions" project group. Special thanks go to

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## 2 Benchmarks

### ■ 2.1 Describing Notebook Performance

The only way to guaranteed savings in the procurement process is by fair and open competition. It gives purchasers more freedom of choice and increases the number of bidders competing for the tender. To ensure that public procurement officers really do profit from fair and open competition, and that the legal requirements of the tender process are complied with, it is imperative to have **non-proprietary, objective evaluation criteria** for a precise analysis of performance.

The best approach to describing performance relies on standardized and generally accepted benchmarks. Benchmarks are based on strict test methods, developed by independent industrial consortiums and software manufacturers, and recognized and supported by manufacturers of ICT products. A benchmark is a program, or a suite of programs, that measures the overall performance of a system, or individual components such as graphics, memory, hard disk, or similar. The advantage of benchmarks is that they provide a specific, comparable and reproducible method of objective measuring the performance of a computer.

In the case of notebooks, both computational performance and mobility are decisive criteria. For this reason, the battery performance of the device is ascertained by repeating performance tests.

### ■ 2.2 Choice of Benchmarks

It is important to differentiate between application benchmarks and synthetic benchmarks.

Synthetic benchmarks test the individual components of a system (CPU, graphics, drives, etc.) and return capability results. However, they do not allow any conclusions on the overall performance of the system.

In contrast to this, application-based benchmarks determine system performance by simulating typical software applications (such as document processing, for example). Thus, application benchmarks measure the overall performance of the system.

As the individual performance of the system's components is not important for evaluating a system, whereas the overall performance is, **application benchmarks produce the most objective results.**

In contrast to ascertaining just the performance (as is the case with e.g. desktop PCs), **the battery performance is additionally taken into consideration** when evaluating notebooks.

Due to the rapid development of computer technology, the underlying microprocessor architecture and the application software benchmarks must be updated on an annual basis.

### ■ 2.3 The BAPCo® Consortium

BAPCo® is an open, non-profit industrial consortium which has developed a series of application-based benchmarks to evaluate the performance of PCs, notebooks on the basis of popular software applications and operating systems. The members of BAPCo® are (status January 2009) AMD, Apple, ARCintuition, Atheros Communications, CNET, Compal, Dell, Hewlett-Packard, Intel, Lenovo, Microsoft, NVIDIA, Toshiba, VIA Technologies, VNU Business Publications Limited (UK), ZDNet and Ziff Davis Media.

## ■ 2.4 Performance test: SYSmark® 2007 Preview

As an application-based benchmark, SYSmark® 2007 Preview measures the overall performance of a computer based on typical office software. SYSmark® 2007 Preview measures computer performance on Windows XP and Vista.

Each run of the benchmark produces multiple individual values:

- E-learning / Video Creation / Office Productivity / 3D Modeling
- and an **overall value**. The overall value comprises the individual values and is thus not equal to the office productivity value.

**The values quoted in this guide are overall values.**

Important Notes

- SYSmark® 2007 Preview benchmark results will differ on the same system depending on whether you use MS Windows Vista or MS Windows XP.
- Considerable differences in the results may also occur between different SYSmark® 2007 Preview version numbers.

It is thus absolutely essential that the tender documents specify both the **operating system** and the SYSmark® 2007 Preview **benchmark version** to be used.

## ■ 2.5 Battery performance: MobileMark® 2007

In contrast to desktop PCs, mobility plays a decisive role with notebooks.

Due to its objectivity, ease of use and popularity, MobileMark® 2007 by BAPCO® is a recommended benchmark for testing notebook battery performance. It supports the Microsoft Windows XP and Windows Vista operating systems.

Running the benchmark creates five different results:

One result each for the following:

- „Productivity 2007 Performance Value“
- „Productivity 2007 Battery Life“
- „DVD 2007 Battery Life“
- „Reader 2007 Battery Life“
- „Wireless 2007 Battery Life“

Although MobileMark® 2007 generates a “Productivity 2007 Performance Value”, this is not comparable with the “SYSmark® 2007 Preview Overall Value”. To ensure compatibility with Desktop PC performance tests, the working group recommends benchmarking only with the SYSmark® 2007 Preview tool.

**The MobileMark® values quoted in this guide thus refer exclusively to the Productivity 2007 Battery Life.**

This guide will be checked at regular intervals to ensure that it is up-to-date. In this context, the benchmark recommendation will also be checked.

## ■ 2.6 Consideration of UfAB IV in the Use of Benchmark Values

UfAB IV (“Unterlage für Ausschreibungen und Bewertung von IT-Leistungen” – Document for the Tender Process and Evaluation of IT Performance) by KBSt, (Koordiniierungs- und Beratungsstelle der Bundesregierung für Informationstechnik in der Bundesverwaltung – the Federal Government’s Coordinating and Advisory Office for Information Technology in Federal Administration) does not refer specifically to the use of benchmarks. According to UfAB IV, the following options are available to duly take benchmarks into consideration in public tenders:

- Benchmark value as a knockout criterion only  
The minimum benchmark value is an “A” (knock-out) criterion. Any system offered **must achieve the required minimum benchmark value**. If a system offered does not achieve this value, **the offer must be excluded from the bidding procedure**. No points are awarded for performance above this level.

- Benchmark value as a knockout criterion and an evaluation criterion  
The minimum benchmark value is an “A” (knock-out) criterion. Any system offered must achieve the required minimum benchmark value. If a system offered does not achieve this value, the offer must be excluded from the bidding procedure. **Additionally, the system can score points via a „B“ (evaluation) criterion within an evaluation scale** if it exceeds the required benchmark value. The points gained here are taken into consideration in cost-effectiveness evaluation.

## ■ 2.7 Procedure for Performing Benchmarks

For all benchmark values it must be assumed that fluctuations in the range of 2% – 5% will occur in each round of the test. Multiple measurements achieve more accuracy. For this reason, **at least three benchmark rounds** should be performed.

The battery charge status and actual battery capacity (depending on age) have a considerable influence on the battery life. Considering this, the batteries used should be new and fully charged whenever possible. Despite this, variations of up to 10 % are possible.

Above and beyond the basic settings of the reference system, operating systems provide many settings that can lead to significantly different results. We recommend **creating a protocol of the optional settings to be used and submitting the protocol along with the tender documents**.

Before use, benchmark programs must be updated to the latest **status**, or at least the status specified by the contracting authority by installing updates or new versions. This guarantees that modern technologies and operating systems, and peripherals are identified and used.

To ensure comparable results, the **prescribed procedure must be precisely adhered to** in performing the benchmark.

### 2.7.1 Installation of SYSmark® 2007 Preview on a system with Microsoft® Windows XP

- Enable and save the BOOT options (CD/DVD drive) in the BIOS
- Operating system: Microsoft Windows XP Professional 32 BIT (English Version) Service Pack 3. Make sure that you only install the operating system itself and the required drivers to avoid impacting the functionality of the benchmark software.
- HDD: Format one partition with NTFS. This partition need not take up the whole disk.
- The installation of Microsoft Windows Vista or Windows XP (32BIT) can be executed from the original CD/DVD, the Recovery CD/DVD, or across a network (factory image). Do not install from an image file. (In case of Windows XP note that additional AHCI/RAID drivers must be installed from the floppy disk drive via the F6 function.)
- Take the following rules into consideration:
- Installation of drivers: Motherboard (INF / chipset driver), data and storage (RAID/AHCI), LAN, USB, graphics card, AUDIO
- Installation of DirectX driver (9.0c for Windows XP or 10 for Windows Vista) by Microsoft
- **In the Device Manager check whether all drivers are installed correctly and that all devices are listed (without error).**  
Start, Setting, Control Panel, System Properties, Hardware Device Manager
- **Disable visual effects**  
Start, Setting, Control Panel, System Properties, Hardware, Advanced, Performance
- **Disable system restore**  
Start, Setting, Control Panel, System Properties, System Restore
- **Disable remote assistance**  
Start, Setting, Control Panel, System Properties, Remote
- **Disable automatic updates**  
Start, Setting, Control Panel, Security Center, Automatic Update
- **Disable security alerts**  
Start, Control Panel, Security Center, Automatic

Update, Resources, Change the way the Security Center alerts me

- **Disable hide inactive icons**  
Right click Start, Properties, Task bar, Select the „Notification area“ tab and uncheck „Hide inactive icons“
- **Remove always on top**  
Right click Start, Properties, Task bar
- **Remove taskbar lock**  
Right click Start, Properties, Task bar
- **Disable the recycle bin (delete data immediately)**  
Right click the Desktop, Properties, Do not move files to the recycle bin
- **The screen resolution must be set to 1024x768 with a 32 bit colour depth and a refresh rate of 75Hz (monitor setting)**  
Right click the Desktop, Properties, Settings, Screen resolution  
Advanced, set the monitor to „Plug and Play Monitor“ and the refresh rate to 75 Hz.
- **No wallpaper**  
Right click the Desktop, Properties, Desktop (none)
- **No desktop screen saver**  
Right click the Desktop, Properties, Screen saver, (none)
- **Disable Windows Fast User Switching**  
Start, Setting, Control Panel, User Account
- **Remove files**  
Start, All Programs, Accessories, System Tools, Disc Cleanup - enable all items
- **Defragmentation of the hard disk**  
Run C:\defrag c: -f or Start, All Programs, Accessories, System Tools, Defragmentation
- **Install the benchmark software and patches**
- **Remove files**  
Start, All Programs, Accessories, System Tools, Disc Cleanup - enable all items
- **Defragmentation of the hard disk**  
Run C:\defrag c: -f or Start, All Programs, Accessories, System Tools, Defragmentation
- **Reboot the system**

## 2.7.2 Installation of SYSmark® 2007 Preview on a system with Microsoft® Windows Vista

- **HDD: Format with NTFS on one partition**
- **Operating system: Windows Vista (English Version) Service Pack 1**
- **The operating system must be newly installed from CD (RAID drivers must be installed via Additional Drivers). Do not install from an image file.**
- **Installation of drivers: Motherboard (INF / chipset driver), data and storage (RAID/AHCI), LAN, USB, graphics card, AUDIO**
- **In the device manager check whether all drivers are installed correctly and that all devices are listed (without error)**
- **Disable Automatic Updates**  
Start, Control Panel, Security, Windows Update. Click the Change Settings link on the left hand side. Select „Never check for updates (not recommended)“
- **Disable the system restore feature.**  
Start, Computer, System properties, System protection (left-hand side), uncheck the „Automatic restore point“ box
- **Remove taskbar lock**  
Right click the task bar Task bar, uncheck „Lock the taskbar“
- **Disable Hide inactive icons**  
Right click the task bar, Task bar, Notification area uncheck „Hide inactive icons“
- **Disable the recycle bin (delete data immediately)**  
Recycle Bin (right click), Properties, check „Do not move files to the recycle bin. Remove files immediately when deleted“
- **The graphics resolution must be set to 1280x1024 with a 32 bit colour depth and a refresh rate of 75Hz (monitor setting)**  
Right click the Desktop, Properties, Display Settings, set resolution to 1280x1024 Advanced Settings, set the monitor to „Plug and Play Monitor“ and the refresh rate to 75 Hz .
- **No Desktop Background (monochrome)**  
Desktop (right click), Personalize, Desktop Background, Select „Picture Location“ =“Solid Colour“

- **No screen saver**  
Desktop (right click), Personalize, Screen Saver. Select „Screen saver“ =“None“
- **Set the Power Management setting to „High performance“**  
Right click the Desktop, Properties, Screen saver, Change Power settings, Set to „High performance“ then „Change plan settings“ below the selection. A new selection appears „Edit Plan Settings.“ Set „Turn off display“ to „Never.“, click Save Change.
- **Disable Windows Defender**  
disable the default: Windows Defender Start at 1 a.m. Start, Control Panel, Security, Windows Defender. Click on „Tools“ in the toolbar at the top. Click on the Options link in the next view. Uncheck all boxes.
- **Disable Automatic Disk Defragmentation**  
Start, Computer“, right click Disk C:, Properties, Tools, Defragmentation, „Defragment Now“. Uncheck „Run on Schedule“.
- **Disable User Account Control (UAC)**  
Start, Control Panel, User Accounts and Family Safety, User Accounts, “Turn User Account Control” on or off, click, uncheck “Uncheck Use User Account Control (UAC) to help protect your computer”, OK, restart computer
- **Disable Automatic Updates**  
Start, Control Panel -> Security -> Windows Update. Click on the change settings link on the left side. Select „Never check for updates
- **Disable security alerts**  
Start, Control Panel, Security, Security Center, on the left-hand side “Change the way the Security Center alerts me” click, select „Don’t notify me and don’t display the icon (not recommended)“
- **Disable Windows Sidebar**  
Remove „Windows Sidebar“ (right click) the Windows sidebar, Properties, uncheck „Start Sidebar when windows Starts“
- **Disable the Welcome Screen**  
Start, Control Panel, System and Maintenance, Welcome Center, „Run at Startup“ un- checked
- **Clean Disk (enable all functions )**  
Start, Control Panel, System and Maintenance,

Performance Information and Tools, Open Disc Cleanup (left-hand side), Perform Disc Cleanup - Enable all items

- **HDD Defragmentation**  
Start, Computer“, right click Disk C:, Properties, Tools, Defragmentation, „Defragment Now“.
- **Install the benchmark software and patches**
- **Clean Disk (enable all functions )**  
Start, Control Panel, System and Maintenance, Performance Information and Tools, Open Disc Cleanup (left-hand side), Perform Disc Cleanup - Enable all items .
- **HDD Defragmentation**  
Start, Computer“, right click Disk C:, Properties, Tools, Defragmentation, „Defragment Now“.
- **Reboot the system**

### ■ 2.7.3 Further Instructions for all operating systems:

Before running the benchmark, please check the following points on the machine:

- The drivers you use should originate from the manufacturer and be state-of-art
- Overclocking of individual components by means of BIOS settings is not permitted.
- Perform BIOS and firmware updates as far as possible (via Internet). Updates should be available via the Internet
- Other optimisations in the form of special drivers or by software and BIOS settings are not permitted

**Launching the SYSmark® 2007 Preview or SYSmark® 2004 SE benchmark software. Do not touch the system while the benchmark is running.**

After 1 or 3 successful runs on systems with the Microsoft® Vista operating system, you must delete the content from the C:\Windows\Prefetch directory before running the software again

## ■ 2.8 Installation of MobileMark® 2007 on a System with Microsoft® Windows XP

- Enable and save the BOOT options (CD/DVD drive) in the BIOS
- Operating system: Microsoft Windows XP Professional 32 BIT (English Version) Service Pack 3. Make sure that you only install the operating system itself and the required drivers to avoid impacting the functionality of the benchmark software.
- HDD: Format one partition with NTFS. This partition need not take up the whole disk.
- The installation of Microsoft Windows Vista or Windows XP (32BIT) can be executed from the original CD/DVD, the Recovery CD/DVD, or across a network (factory image). Do not install from a backup image file. (In case of Windows XP note that additional AHCI/RAID drivers must be installed from the floppy disk drive via the F6 function.)

Take the following rules into consideration:

- Installation of drivers: Motherboard (INF / chipset driver), data and storage (RAID/AHCI), LAN, USB, graphics card, AUDIO
- Installation of DirectX driver (9.0c for Windows XP or 10 for Windows Vista) by Microsoft
- **In the device manager check whether all drivers are installed correctly and that all devices are listed (without error).**
- **Disable automatic updates**  
Start, Setting, Control Panel, Security Center, Automatic Update
- **Disable security alerts**  
Start, Control Panel, Security Center, Automatic Update, Resources, Change the way the Security Center alerts me
- **No background image**  
Right click the desktop, Properties, Desktop, Background “none” and select the colour “white”, then, using a brightness meter, set the brightness to 60 nits. The measuring point is at the centre of the monitor (Nits = luminosity).
- **No desktop screen saver R**  
Right click the Desktop, Properties, Screen saver, (none)
- **Disable alarm for critical battery charge state**  
Start, Control Panel, Power option, Alarms, uncheck both boxes for alarms in case of low and critical battery state
- **Set the power management option on portable/laptop computers**  
Start, Control Panel, Power option, Power schemes and all settings under Settings for Timers of “Portable/Laptop” power scheme “Plugged in” and “Running on Set battery” to “Never”
- **Disable hibernate**  
Start, Control Panel, Power option, Hibernate, uncheck “Enable Hibernation”.
- **Remove files**  
Start, All Programs, Accessories, System Tools, Disc Cleanup - enable all items
- **Defragmentation of the hard disk**  
Run C:\defrag c: -f or Start, All Programs, Accessories, System Tools, Defragmentation
- **Install the benchmark software and patches**
- **Remove files**  
Start, All Programs, Accessories, System Tools, Disc Cleanup - enable all items
- **Defragmentation of the hard disk**  
Run C:\defrag c: -f or Start, All Programs, Accessories, System Tools, Defragmentation
- Reboot the system

### 2.8.1 Installation of MobileMark® 2007 on a system with Microsoft® Windows Vista

- Enable and save the BOOT options (CD/DVD drive) in the BIOS
- Operating system: Microsoft Windows XP Professional 32 BIT (English Version) Service Pack 3. Make sure that you only install the operating system itself

and the required drivers to avoid impacting the functionality of the benchmark software.

- **HDD:** Format one partition with NTFS. This partition need not take up the whole disk.
- The installation of Microsoft Windows Vista or Windows XP (32BIT) can be executed from the original CD/DVD, the Recovery CD/DVD, or across a network (factory image). Do not install from a backup image file. (In case of Windows XP note that additional AHCI/RAID drivers must be installed from the floppy disk drive via the F6 function.)
- Take the following rules into consideration:
- Installation of drivers: Motherboard (INF / chipset driver), data and storage (RAID/AHCI), LAN, USB, graphics card, AUDIO
- Installation of DirectX driver (9.oc for Windows XP or 10 for Windows Vista) by Microsoft
- **In the device manager check whether all drivers are installed correctly and that all devices are listed (without error).**  
Start, Setting, Control Panel, System Properties, Hardware Device Manager
- **Disable security alerts**  
Start, Control Panel, Security, Security Center, on the left-hand side “Change the way the Security Center alerts me” click, select “Don’t notify me and don’t display the icon (not recommended)”
- **Disable Automatic Updates**  
Start, Control Panel -> Security -> Windows Update. Click on the change settings link on the left side. Select “Never check for updates
- **No Desktop Background (monochrome)**  
Desktop (right click), Personalize, Desktop Background, Select “Picture Location” = “Solid Colour” “white” and use a brightness meter to set the brightness to 60 nits. The measuring point is at the centre of the monitor (Nits = luminosity).
- **No screen saver**  
Desktop (right click), Personalize, Screen Saver. Select “Screen Saver” = “None”
- **Disable alert for critical battery charge state**  
Start, Control Panel, Power option, Alarms, uncheck both boxes for alarms in case of low and critical battery state

- **Set the power management option on portable/laptop computers**

Start, Control Panel, Power option, Power schemes and all settings under Settings for Timers of “Portable/Laptop” power scheme “Plugged in” und “Running on Set battery to “Never”

- **Disable hibernate**

Start, Control Panel, Power option, Hibernate, uncheck “Enable Hibernation”.

- **Clean Disk (enable all functions )**

Start, Control Panel, System and Maintenance, Performance Information and Tools, Open Disc Cleanup (left-hand side), Perform Disc Cleanup - Enable all items .

- **HDD Defragmentation**

Start, Computer”, right click Disk C., Properties, Tools, Defragmentation, “Defragment Now”.

- **Install the benchmark software and patches**

- **Clean Disk (enable all functions )**

Start, Control Panel, System and Maintenance, Performance Information and Tools, Open Disc Cleanup (left-hand side), Perform Disc Cleanup - Enable all items .

- **HDD Defragmentation**

Start, Computer”, right click Disk C., Properties, Tools, Defragmentation, “Defragment Now”.

- Reboot the system

Note:

- The battery must be 100% charged
- The results depend greatly on the setting of the screen brightness! Recommendation: Self-certification, if the measurement is performed by the contracting authority, pay special attention to compliance with BAPCO® specifications.
- Vendor-dependent software packages influence power consumption (disable USB ports, etc.)

## 3 Minimum requirements according to user profile examples

The following three categories (A, B, C systems) are orientated on the primary usage of the notebook.

The usage is the basis for determining the system configuration.

Usage	Definition	Category
„Simple“ Mobility (i.e. occasional trips)	Mains-independent working at least 3 hours (normal office applications), 14“ – 15.4“ display	A System
„Medium“ Mobility (i.e. regular trips)	Weight approx. 2.8 kg (incl. optical drive and standard battery, excluding power supply), mains-independent working at least 4 hours (normal office applications), 14“ – 15.4“ display	B System
„High“ Mobility (i.e. frequent trips)	Weight approx. 2 kg (incl. optical drive and standard battery, excluding power supply), mains-independent working at least 4.5 hours (normal office applications), 14“ – 15.4“ display	C System

## 4 Minimal Technical Requirements for Non-Proprietary Product Performance Description

The following table contains a summary of the recommended minimal requirements for the configuration of

the A, B and C systems. The following sections contain further information on this.

System component	A System	B System	C System
Benchmark Sysmark® 2007 Preview Overall Value (Vista)	115	110	100
Benchmark Sysmark® 2007 Preview Overall Value (XP)	120	115	105
Benchmark MobileMark® 2007 „Productivity Battery performance“ (XP und Vista)	200 Minutes <sup>1</sup>	200 Minutes <sup>1</sup>	200 Minutes <sup>1</sup>
	Max. 3 kg <sup>2</sup>	14“: Max. 2.5 kg 15“: Max. 3 kg	Max. 2 kg <sup>2</sup>
Case	Defined via display size	Defined via display size	Defined via display size
Display size in inches	14“ - 15,4“	14“ - 15,4“	<14“
Display resolution	WXGA (1280x800) For 15“ higher resolutions optionally possible up to a maximum of 1680x1050)	WXGA (1280x800) For 15“ higher resolutions optionally possible up to a maximum of 1680x1050)	WXGA (1280x800)
Luminosity (cd/m <sup>2</sup> )	180	180	180
Contrast	200:1	200:1	200:1
Processor	x86 architecture Dual core	x86 architecture Dual core	x86 architecture Dual core
Optical drives SATA	DVD Multiple Standard Burning Device	DVD Multiple Standard Burning Device	DVD Multiple Standard Burning Device
RAM DDR 2	2 GB (see 2.9)	2 GB (see 2.9)	2 GB (see 2.9)
Hard disk SATA	120 GB SATA	120 GB SATA	120 GB SATA
Network connections RJ45 onboard/PCIe	10/100/1000	10/100/1000	10/100/1000

System component	A System	B System	C System
Graphics PCIe	256 MB Integrated or discrete	256 MB integrated	256 MB integrated
Interfaces	VGA	VGA	VGA
	3 x USB 2.0 RJ45	3 x USB 2.0 RJ45	2 x USB 2.0 RJ45
Bios, drivers, OS	Standard setup	Standard setup	Standard setup
System management Security	see guide	see guide	see guide
1	Same values for A, B and C systems as a smaller device uses less power thanks to its smaller display.		
2	Without multiple standard or DVD burning device		

### 4.1 Benchmarks

Technical requirements	Benchmark
Standards	BAPCO® MobileMark® 2007 / SYSmark®2007 Preview
URL	www.bapco.com

See Chapter 2 of Guide for details

### 4.2 Weight

Technical requirements	Weight
Standards	kg
URL	-

- A System: Maximum 3 Kg
- B System: Maximum 2.6 Kg
- C System: Maximum 2 Kg

As multiple standard or DVD burning devices can considerably increase the weight, but are very often not necessary in notebooks, these weight values refer to devices without multiple standard or DVD burning devices.

### 4.3 Case / Display Size / Display Properties

Technical requirements	Form factor
Standards	This is defined by the display size.
URL	
Non-glare display	
Diagonal size of TFT display	Typical sizes: 12" 13" 14.1" 15.4"
TFT display resolution	Native resolutions: For > 14" = WXGA (1280x800) 14" - 15.4" = WXGA 1280x800 (Standard) 1440x900 1680x1050 1920x1200
Highly luminous TFT display in Candela / m2 (cd/m2)	Currently available approx. 150 – approx. 350
Contrast ratio	Currently available approx. 200:1 – approx. 300:1
Angle of view at contrast 10:1 (note: angle of view is also a factor with security relevance - shoulder surfing!)	Currently available approx. 100 – approx. 160

Note: The combination of luminosity, contrast and dependency on the angle of view is more important than exact compliance of measured values.

The higher the native (i.e. actual, physical) resolution, the smaller the display (font size, icons, etc.). Note: also note that displays can only be run optimally at their native resolution. Changing the resolution entails loss of display quality. (This cannot be compensated for by changing the font size).

### 4.4. Rechargeable battery

Technical requirement:	Rechargeable battery
Standards:	Lithium ion / Lithium polymer

Comments: Easily changeable without tools  
 Optional: Availability of rechargeable batteries with a larger capacity as a replacement or supplement.  
 There is a relationship between the battery capacity and the weight (info e.g. number of cells in the Glossary)

### 4.5 Power supply

Technical requirement:	Power supply
Standards:	Industry standard
URL	<a href="http://www.formfactors.org">www.formfactors.org</a>

The device should fully comply with the most recent version of the Energy-Star program for Computers. Current version of Energy Star is V4.0 for notebooks (probably valid until June 2009). See „Catalog of Criteria for Environmentally-friendly Procurement of Notebooks“

- Mains side 110-220 V; 50-60 Hz
- Active PFC
- Hold-up time

Note:

- Battery charging times depend on the power supply's maximum performance.

- During operations, a battery that is almost empty should be charged to approx. 90% of its maximum capacity within 3 hours.
- Identical power supplies for docking station and direct connection are recommended.

### 4.6 Processor

Technical requirements	Processor
Standards:	x86 architecture

The processor (aka CPU or Central Processing Unit) is the central component of the computer. Desktop systems typically use x86 architecture.

A Dual Core CPU, where two CPU cores are integrated in a single CPU housing, is recommended for notebooks of all classes. This improves the computing performance and improves response times in case of heavy load.

### 4.7 Optical drives

Technical requirement:	Optical drives
Standards:	DVD recommended; (CD obsolete)

2008 state-of-art technologies

- DVD ROM drive
- DVD Multiple Standard Burning Device

All internal drive types are currently connected via SATA.

There are three types of optical drives available: fixed internal, removable internal, and external.

DVD ROM drives are becoming increasingly rare on the market, and, if needed, can be replaced by DVD writers where the writing ability can be reliably disabled.

(Note for contracting authority: consider a migration concept Floppy -> DVD)

### ■ 4.8 RAM

Technical requirement:	Memory: RAM
Standard	DDR 2

Standard of 2 GB RAM recommended, 1x2GB to allow an upgrade of 1GB to 3GB without uninstalling (Exceptions: Category C upgrade to 3 GB may entail uninstalling).

The industry offers mobile systems with 2 memory banks. Depending on RAM upgrade options, the minimal requirements should be defined to ensure that both modules are pluggable

The following memory module sizes are typical today:

- 512 MB DDR 2-SDRAM
- 1 GB DDR 2-SDRAM
- 2 GB DDR 2-SDRAM

The next generation will be DDR3

Note:

- Replacing modules can be complicated for mobile systems. We recommend choosing a RAM size that avoids the need for upgrades from the outset.
- At least 2GB RAM are recommended for use with Windows XP (price / performance) and/or with Windows Vista.

Since the use of 4 GB only makes sense with 64 bit operating systems, an extension to 3 GB is sufficient for performance reasons on 32 bit operating systems.

### ■ 4.9 Hard disks

Technical requirements	Hard disks
Standards	Industry standard SATA

Entry level

- 120 GB SATA
- 160 GB SATA
- 250 GB SATA

Hard disks are currently offered with the following rotational speeds:

- 5400U/min (standard)
- 7200U/min

A higher speed (with the same capacity) means a higher data transfer rate.

Due to mobile operations, the danger of data loss is greater than with a desktop

As an alternative Solid State Drives (SSD) may be used; SSDs do not contain any mechanical moving parts and are thus far more resistant against mechanical shocks.

To protect a notebook against loss of sensitive data, „self-encrypting“ hard disks may be used.

### ■ 4.10 Network connection

Technical requirement:	Network connection
Standards:	Ethernet; Gigabit (10/100/1.000) RJ45 Glossary

All systems support 10/100/1000 Mbit/s

Optional:

- WLAN IEEE 801.11 b/g/(n optional) (tech. details in the Glossary)
- UMTS integrated or as plug-in module. **Watch out for provider dependencies!**
- Bluetooth

It should be possible to disable wireless communications interfaces by means of mechanical keys or switches.

The notebook should support “**Wake on LAN**” (WOL) and **Preboot Execution Environment (PXE)** (network boot capability).

Note:

- Wake on LAN (WOL) should be disabled by default for security reasons.
- For disabling of functions: details see Glossary

### ■ 4.11 Graphics

Technical Requirements:	Graphics
Standards:	Industry standard for Windows XP DirectX 9/SHADER 2.0 and/ or Windows Vista DirectX 10

A distinction must be made between onboard solutions where the graphics chipset is integrated on the motherboard, and the use of an external extension card.

Onboard solutions must fulfill the following minimal hardware requirements:

- For Windows XP: DirectX9.0 support with Shader 2.0
- For Windows Vista: DirectX 10
- 128 MB RAM , preferably > 254 MB addressable via main memory (shared RAM)

External extension cards must fulfil the following minimal hardware requirements:

- A graphics card with PCI Express (16 line bus width)
- For Windows XP: DirectX9.0 support with Shader 2.0

- For Windows Vista: DirectX 10
- At least 128 MB RAM local memory, preferably 256 MB

The use of a graphics card means higher power consumption compared with on-board graphics; this in turn means poorer battery performance and/or a lower battery performance value

- A System: Depending on the main use onboard graphics or external graphics card
- B System: Onboard graphics sufficient
- C System: Onboard graphics sufficient

Graphics resolution for external displays:

- The VGA, XGA and WXGA standards should be supported at a refresh rate of 60 Hz.

### ■ 4.12 Interfaces

Technical requirement:	Interfaces (external I/O ports)
Standards:	USB 2.0; RJ 45

Possible interfaces

- USB 2.0 interfaces up to 4
- VGA or DVI or Displayport interface (VGA or alternative adapter, as long older monitors shall be used)
- Ethernet (RJ45; s. network)

Optional interfaces **depending on individual requirements** and security requirements:

- Parallel (for old Plotter/printers)
- Serial port (e.g. plotter)
- Audio in/out
- Bluetooth
- Firewire
- E-SATA

The above mentioned individual requirements can be implemented by means of adapters, port replicators or docking stations.

### 4.13 Docking station

Technical requirement:	Docking station (optional)
Standards:	Always vendor-specific

Comments:

Not part of the standard scope of delivery

This term is not used identically by all vendors Notebook (vendor) specific:

- Docking station
- Port replicator
- Mini dock
- ...

Common features: Vendor and possibly model-specific device that is connected to the notebook via a vendor-specific interface.

The following interfaces are typically provided:

- USB
- VGA / DVI
- Power
- Ethernet
- Audio in/out

Less frequently

- PS/2
- Display port
- Serial
- Parallel
- Firewire

Non-specific:

- USB-based

Restricted functionality compared to specific solution (e.g. no charging function)

Notes on the use of external displays:

- External display must support DDC.

- In case of desktop replacement by notebooks < 15.4“, a port replicator and an external display are necessary

### 4.14 Input/Output Devices

Technical requirement:	Input/Output Devices
Standards:	Keyboard, Mouse

Mouse replacement

- Keyboard stick and / or
- Touchpad

Optional:

- Camera
- Fingerprint reader / Biometric sensor
- Data media (DVD; floppy)
- Loudspeakers; microphone
- Smartcard
- Card reader (memory card [SD, ...])
- Braille keyboard

Note:

For security reasons, you should check if input and output devices should be permitted or prohibited.

### 4.15 BIOS, Drivers, Operating System

Technical requirement:	BIOS; Drivers; Operating System
Standards:	Standard setup

The BIOS (Basic Input Output System) checks all system components for functionality during the POST (Power on self test).

Required functions for all systems

- Standard setup (time, drives) in CMOS-RAM with battery / rechargeable battery buffer
- Password protection for setup routine and boot process

- Automatic type detection for IDE / SATA disks
- BIOS in Flash EPROM and thus update capability via utility
- BIOS reset to required factory state by jumper
- Boot sequence configurable (hard disk, CD-ROM, USB,...)
- USB support
- ACPI support
- S.M.A.R.T support

It should be possible to query the BIOS manufacturer.

Drivers:

- All system drivers must be up-to-date and support conflict-free operations.
- Driver updates of standard components must not cause system conflicts.
- Driver updates should be available on separate medium and/or as an Internet download to reflect the built-in components.

Operating system:

No reference will be made at this point regarding the functionality of MS Vista or similar operating systems.

### ■ 4.16 System Management, Security

Technical requirement:	System Management, Security
Standard	None

In individual cases, system management or special system protection (security) may be desirable.

- In case a system management/remote maintenance/remote control should be implemented, the following BIOS functions are necessary, which are defined as remote functions:
- Extensive system inventorying by remote access, includes e.g. serial number of the display, the memory slot configuration, CPU type and installed software:

- Pre-defined inventory reports
- Off/Online data support
- Graphical user interface
- BIOS Management
  - Works under a running operating system
  - automatic detection of suitable BIOS
- Modification of:
  - BIOS passwords
  - Boot sequence
  - enabling/locking of USB memory devices
- fan monitoring, temperature (CPU and case), voltage (CMOS battery)
- Alarm function for LAN/ASF: Case break-in (optional), CPU, heart-beat, error on commissioning system
- Energy management
  - client power-off
  - switch to other power states (e.g. ACPI-S5)
- PXE 2.0 Boot Code
- Boot from ACPI-S5 mode (power-off mode)
- Flash EPROM: Local BIOS update

**Security:** In case of special security requirements, the following options are available.

- Physical protection
  - Theft protection: case lock (wire locks, case locks)
  - Laser marking
- User and data security
  - User identification
  - System detection
  - encryption of files and directories
  - TPM 1.2 (Trusted platform module, a chip that stores keys, passwords and digital certificates)
- Distinct activation/deactivation of the USB ports
- Start-up password (immediately after power-on)
  - Pre-boot hard disk password
  - BIOS passwords (Supervisor PW, User PW)
- SmartCard / Biometrics
- Operating system password
- Securing system against power failure in standby mode)
- USB stick security (BIOS function to prevent unauthorized access to system. The system can only boot when the USB stick is attached)

- Encryption software
- PC security (defense against external threats from viruses, spyware, spam, hackers)
- SW firewalls, antivirus SW, anti-spyware SW, anti-spam SW

## 5 “Non-technical” Requirements

### ■ 5.1 Other services

In case of tenders for other services in the scope of PC procurement, the following variants can be distinguished:

- Pre-installation of software and/or hardware provided by purchaser
- Installation on site

The following variants are popular:

- Pre-installation of the PC, operating system
- Pre-installation of the PC, operating system, surcharge with software as per requirement
- Creation of a „Golden Disk“ (image) with basic components (operating system, Office...) incl. description of use

Pre-installations performed by the manufacturer/vendor are elements of the purchasing contract. The EVB IT purchasing contract (Ergänzende Vertragsbedingungen für die Beschaffung von IT-Leistungen – Supplementary Contract Conditions for the Procurement of IT Services) explicitly provides pre-installations, even installation services.

The contract also falls under the category purchasing contract if besides the shipment itself to a minor degree other services (like installation and configuration on site) should be performed. In this special case you should not use the EVB-IT purchasing contract (EVB-IT Kaufvertrag) but instead use the EVB-IT system shipment contract (EVB-IT Systemlieferungsvertrag) as soon it will be published. Until then use the old BVB purchasing contract (BVB-Kaufvertrag).

This link gives more information about the different kind of contracts:

[www.cio.bund.de/cae/servlet/contentblob/81626/publicationFile/16784/evb\\_it\\_bvb\\_entscheidungshilfe\\_pdf\\_download.pdf](http://www.cio.bund.de/cae/servlet/contentblob/81626/publicationFile/16784/evb_it_bvb_entscheidungshilfe_pdf_download.pdf)

The EVB-IT and additional information about it's use is also available on the KBSt (Koordinierungs- und Beratungsstelle für Informationstechnik in der Bundesverwaltung – Coordination and Advisory Office for Information Technology in Federal Administration) website at:

[www.cio.bund.de/cln\\_093/DE/IT-Angebot/IT-Beschaffung/it-beschaffung\\_node.html](http://www.cio.bund.de/cln_093/DE/IT-Angebot/IT-Beschaffung/it-beschaffung_node.html)

This site also provides more information on legal issues in the context of hardware procurement.

### ■ 5.2 Support

If needed, support should be agreed specifying the reaction time / repair time.

Typical market offers differ with respect to

- Duration of contract
- Reaction time (time between reporting the malfunction and initial reaction by supports)
- Repair time (time between reporting the malfunction and restoring of system functionality)
- Spare parts logistics
- Additional technical services on a pro rata basis (hourly rates, traveling expenses)

Requirements could be as follows, depending on needs:

- 3, 4 or 5 years on-site service
- On-site service with a reaction time of x hours
- On-site service with a repair time of x hours
- Availability of a hotline x hours y days per week
- Spare part delivery without replacement by service technician

- Stock of spare parts customer-side

In the scope of the procurement of high-availability or security-relevant solutions, individual agreements should be met. In this case, the need for requirements must be weighed up against the costs incurred by them.

### ■ 5.3 Logistics

The following logistics features can be agreed if needed:

- Specification of maximum delivery time
- Delivery franco domicile
- Delivery abroad
- Delivery to different destinations
- Delivery to specific rooms
- Asset Management handling

## 6 Evaluation of Offers

Sections 4 and 5 describe the criteria for evaluating a non-proprietary description of services and performance. Bidders draft their offers based on this description of services and performance.

These offers are validated and evaluated by an approving office. The approving office is obligated to accept the most economical offer. With reference to the evaluation matrix, the current version (IV) of the “Unterlage zur Ausschreibung und Bewertung von IT-Leistungen” (Document for the Tender Process and Evaluation of IT Performance - UfAB) offers considerable support [www.cio.bund.de/cln\\_093/DE/IT-Angebot/IT-Beschaffung/UfAB/ufab\\_node.html](http://www.cio.bund.de/cln_093/DE/IT-Angebot/IT-Beschaffung/UfAB/ufab_node.html)

### ■ 6.1 Measuring Protocols (Esp. Benchmarks)

For many evaluation criteria evaluation **on the basis of written offers is feasible** and typically sufficient. However, for some performance requirements, **measurements** performed on the subject of the offer, are required for better and more sustainable validation of the fulfillment of requirements. These evaluation criteria include

- Noise emission,
- Electromagnetic emission
- and especially Benchmark values.

Pursuant to legal requirements for official tenders, it is not permissible to required bidders to perform appropriate measurements and submit measuring protocols of the results for relevant requirements. However, the approval office must decide whether measuring protocols

- Must be provided by **every** bidder,
- Must be provided only by the **most economic** bidder(s) to verify the offer, or
- If the office will **waive** the requirement to submit measuring protocols

Requiring measuring protocols can help to identify potential defects with respect to the capabilities of the PCs offered in the bid evaluation phase – that is prior to issuing of order.

Requiring each bidder to produce a measuring protocol constitutes a considerable effort on the part of each bidder with respect to the measurements to be performed. Only the successful bidder can compensate for this effort due to receiving an order. The approval office should therefore carefully consider to what extent this requirement for all bidders is reasonable with respect to the object of the tender.

As an alternative a requirement by the approval office for the **most economic bidder based on sighting of submitted tender documents** to provide a measurement protocol could be considered (the request could also be issued to several economic bidders).

**General waiving** of the requirement for measuring protocols can only be considered in case of small volumes.

#### **Recommendation:**

In case of small volume orders, we urgently recommend waiving the requirement for all bidders to submit measurement protocols! Due to the effort involved in the measurement, the number of competitive bids might be significantly reduced. The following table should give a **non-binding orientation**:

Number of notebooks	Measuring protocol?
Less than 100	Generally waive requirement for measuring protocols
Less than 1000	Approval office should require most economic bidder to submit measuring protocol
Above 1000	From all bidders

### ■ 6.2 Evaluation Process for Measuring Protocols

In cases (see above) in which measuring protocols are required, the objective is to verify the details of the written offer by reference to the protocol.

- If all bidders are required to submit measuring protocols with their bids, the approval office can reach a decision on the basis of the written offers.
- The following applies to cases where the most economic bidder is required to submit a measuring protocol:
  - If the measurements **confirm** the details in the offer, the offer remains valid and is thus the most economic offer. The conditions for allocation of order to the offer are thus given.
  - If the measurement **fails to confirm** the object of the bid, this will lead to a degradation of the bid, or to exclusion of the bid, depending on the evaluation criterion in question. In such a case, the **ranking of the submitted bids may change**. The most economic bidder based on the new ranking must now be asked to submit a measurement protocol to support their bid. These process steps must be repeated until one measurement confirms the details of the submitted bid.
- Depending on the party performing the test (bidder or approval office), the following details are integral parts of the measurement:
  - Test method (which test methods were applied, including all relevant ambient conditions, test procedure)
  - Schedule for tests (when to request the test, how quickly must the test system be provided by the bidder on request etc.)
  - If appropriate, cost of test (e.g. who bears the costs in case of an unsuccessful test)
  - If appropriate, liability issues relating to the object of the test (who is responsible in case of damage to the object of the test)
  - Option/obligation of bidder's participation in test.

### ■ 6.3 Performance of Measurement

Where measurements are to be performed, you must detail all relevant requirements transparently for the bidder in the tender documents.

Systems can either be measured **by the bidder** or alternatively **by the approval office**. In the latter case, the measurements to be performed on the test system can either be performed by internal experts or by third party experts (this is preferable in case of dispute concerning acceptance/independence of the test results).

The German Association for Information Technology, Telecommunications and New Media (BITKOM) represents over 1,200 companies. Its more than 900 direct members generate a sales volume of 135 billion euros annually and employ 700,000 people. They include providers of software, IT and telecommunication services, manufacturers of hardware and consumer electronics as well as digital media enterprises. BITKOM is committed in particular to an improved regulatory framework, a modernized education system and an innovation oriented economic policy

Das Beschaffungsamt des Bundesministerium des Innern kauft Waren und Dienstleistungen für 26 Bundesbehörden, vom Bund finanzierte Stiftungen und international tätige Organisationen ein. Unser Produktportfolio reicht von A wie Alarmtechnik bis Z wie Zelte, über Hubschrauber bis zu vielfältigen Dienstleistungen. Im Jahr 2007 haben wir 1256 Aufträge mit einem Gesamtvolumen von 546 Mio. € vergeben.



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