DATATON WATCHOUT
WINDOWS 10 ENTERPRISE TWEAKING GUIDE

dataton

INTRODUCTION

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WATCHOUT is the leading multi-display and projection-mapping software with over 17 years of unrivalled performance and reliability under its belt. Award-winning WATCHOUT can be used in a wide range of applications, from smaller fixed installations, to world-record video walls and large, complex live events.

In general, building a high performance, top quality and reliable WATCHOUT media server requires a combination of well-developed skills to select the right hardware, tune the BIOS settings and tune the Microsoft Windows® 10 operating system.

In addition to these skills, there are other points to consider before choosing to build your own server or buy a preconfigured WATCHOUT server from Dataton. These are:

- Support
- Warranty and service
- Longevity & 24/7 use
- New drivers
- Microsoft EULA when building for reselling
- Dataton's WATCHOUT media servers

This Windows 10 Enterprise tweaking document is designed as a guide when building your own WATCHOUT media server.

SUPPORT

If you purchase a Dataton WATCHOUT media server (WATCHMAX or WATCHPAX range), we know the hardware configuration and can therefore recreate – and fix – any challenges you may have with your show. We can, for example, take your show files and apply them directly into a 100% identical server on our side to recreate the issue.

If you have built your own server, the possibility to provide qualified support is limited, as we do not know your hardware and its settings, nor how the operating system is set up and tweaked. This makes it impossible to fully re-create any issues you may have, and unfortunately, we may not always be able to provide a satisfactory answer through our support department.

WARRANTY AND SERVICE

Most off-the-shelf consumer products have a one-year warranty. Some industrial or professional-grade components have a three-year warranty. When buying a media server from Dataton you have the option of extending the warranty up to five years with access to service and support.

LONGEVITY AND 24/7 USE

Many installations with media servers involve long operating hours, some even running round-the-clock. Consumer-grade products are simply not built for this kind of use. Manufacturing hardware designed to run 24/7 or 14-18 hours per day requires a different approach to design and the choice of subcomponents.

NEW DRIVERS

When building a custom media server, one of the challenges is to keep your system up-to-date, utilizing the latest drivers from the hardware manufacturers. In some of the worst-case scenarios we have seen, applying the latest driver of a hardware component has rendered the full system useless and necessitated a complete re-installation. With a locked down and thoroughly tested media server system from Dataton, you do not need to think about testing and tuning your system with new drivers. We take care of this for you, ensuring the system plays at its best.

MICROSOFT EULA WHEN BUILDING FOR RESELLING

If you are building WATCHOUT media servers for commercial purposes, make sure that you have the right to resell Microsoft Windows®.

DATATON'S WATCHOUT MEDIA SERVERS

As an alternative to building your own server, Dataton offers a range of media servers that are tuned for WATCHOUT – and include a license. You can read more about our WATCHOUT server range at https://www.dataton.com/products/media-servers. From a service and support perspective, we recommend this solution.

WINDOWS 10 ENTERPRISE TWEAKING GUIDE

This document will provide guidance on how to prepare Windows for WATCHOUT usage. It is recommended that you are offline during the procedure to prevent Windows from downloading additional content and updates. Required updates should be installed manually and downloaded in advance from the Microsoft Update Catalog.

1 INSTALL WINDOWS

Make a clean install and create a system partition (C:) of at least 32 GB. It is possible to shrink this partition later if needed. It's recommended that you prepare a separate drive or partition (D:) for WATCHOUT.

1.1 DON'T MAKE CORTANA YOUR PERSONAL ASSISTANT
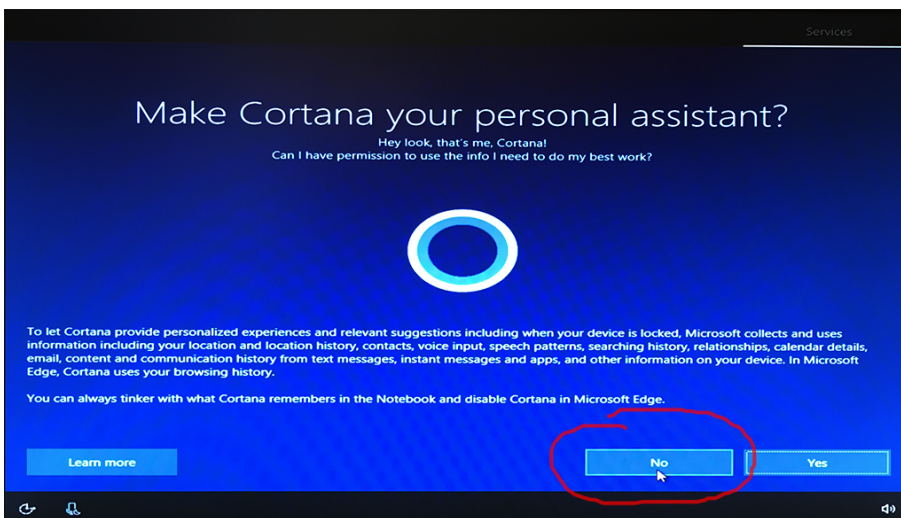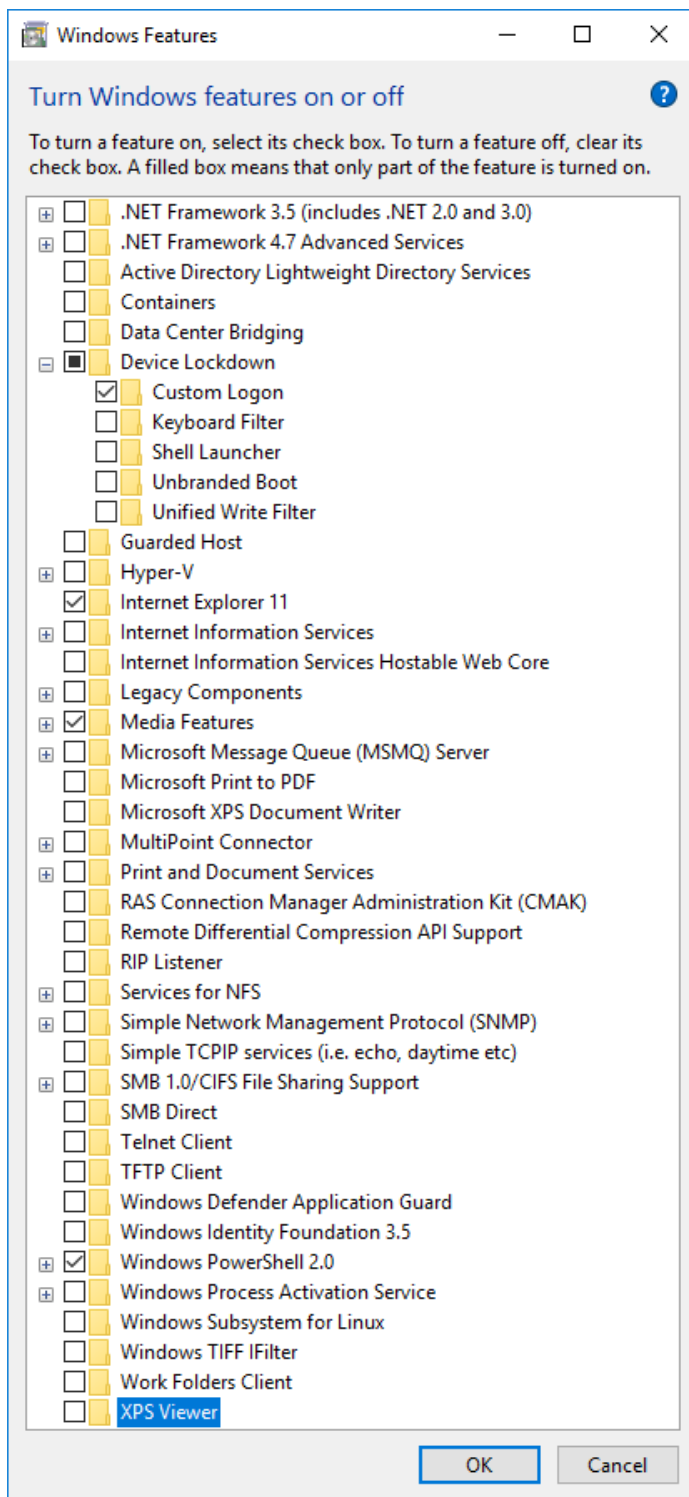

1.2 TURN OFF ALL PRIVACY SETTINGS

- Location
- Diagnostics
- Relevant ads
- Speech recognition
- Tailored experiences with diagnostic data
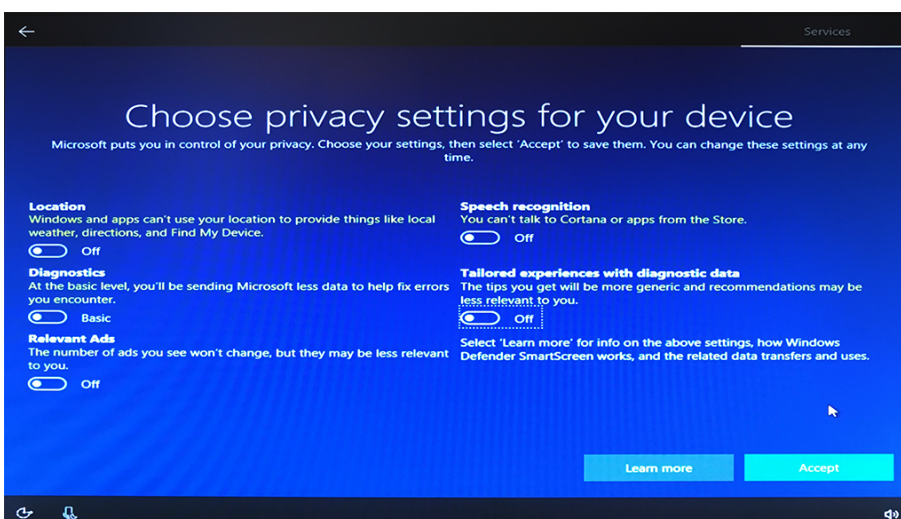
2 ADD AND REMOVE WINDOWS FEATURES

Enable and disable features according to the image below and restart.

3 UPDATES

Install cumulative update [KB4090913](KB4090913).

4 DISABLE AND DELETE HIBERNATION FILES

The following command disables hibernation. Not having a hibernation file reduces the OS footprint dramatically. Run cmd as admin and enter the following command.

powercfg -h off

Hibernation files will be deleted upon next reboot.

5 REMOVE WINDOWS COMPONENTS

The following commands remove most of the programs and apps that are not needed on a WATCHOUT system. Open Windows PowerShell as admin and type in the following.

Get-AppxPackage | Select Name, PackageFullName

This will list all installed Windows packages of which some can be removed. Enter the following commands to purge unwanted packages.

Remove-AppxPackage Microsoft.WindowsAlarms_10.1706.2401.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.WindowsCamera_2017.727.20.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.WindowsStore_11706.1002.9.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.StorePurchaseApp_11706.1707.7010.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.MicrosoftSolitaireCollection_3.17.8162.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Services.Store.Engagement_10.0.1610.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Services.Store.Engagement_10.0.1610.0_x86__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.BingWeather_4.21.2492.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Advertising.Xaml_10.1705.4.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Advertising.Xaml_10.1705.4.0_x86__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.XboxApp_31.32.16002.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.XboxSpeechToTextOverlay_1.17.29001.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.XboxGameOverlay_1.20.25002.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Xbox.TCUI_1.8.24001.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.XboxIdentityProvider_12.30.5001.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.People_10.2.2351.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Messaging_3.32.15001.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.MicrosoftStickyNotes_1.8.2.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.WindowsSoundRecorder_10.1706.1561.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Windows.Photos_2017.37071.16410.0_x64__8wekyb3d8bbwe
Remove-AppxPackage microsoft.windowscommunicationsapps_17.8241.41275.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.ZuneVideo_10.17063.24021.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.ZuneMusic_10.17063.24021.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.WindowsMaps_5.1706.2261.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Wallet_1.0.16328.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Office.OneNote_17.8366.57611.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Microsoft3DViewer_1.1707.26019.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.MSPaint_2.1709.4027.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Print3D_1.0.2422.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.GetHelp_10.1706.1811.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.Getstarted_5.11.1641.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.MicrosoftOfficeHub_17.8414.5925.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.SkypeApp_11.18.596.0_x64__kzf8qxf38zg5c
Remove-AppxPackage Microsoft.WindowsFeedbackHub_1.1705.2121.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.DesktopAppInstaller_1.0.12161.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.OneConnect_3.1708.2224.0_x64__8wekyb3d8bbwe
Remove-AppxPackage Microsoft.WindowsCalculator_10.1706.2406.0_x64__8wekyb3d8bbwe

Note that components like OneDrive, Cortana and Edge cannot be removed in this way.

6 UNINSTALL ONEDRIVE

Search for OneDriveSetup. It is located in multiple locations but you should use the one in the user folder structure. Open cmd as admin. In this example the user name is "WO".

- Navigate to the location of OneDriveSetup using cmd.
  cd C:\Users\WO\AppData\Local\Microsoft\OneDrive\17.3.6816.0313
- Terminate OneDrive.exe using cmd.
  taskkill /f /im OneDrive.exe
- Uninstall OneDrive using cmd.
  OneDriveSetup.exe /uninstall
- Reboot.

Note that the OneDrive icon on the taskbar has disappeared and the list of installed apps is very minimalistic.
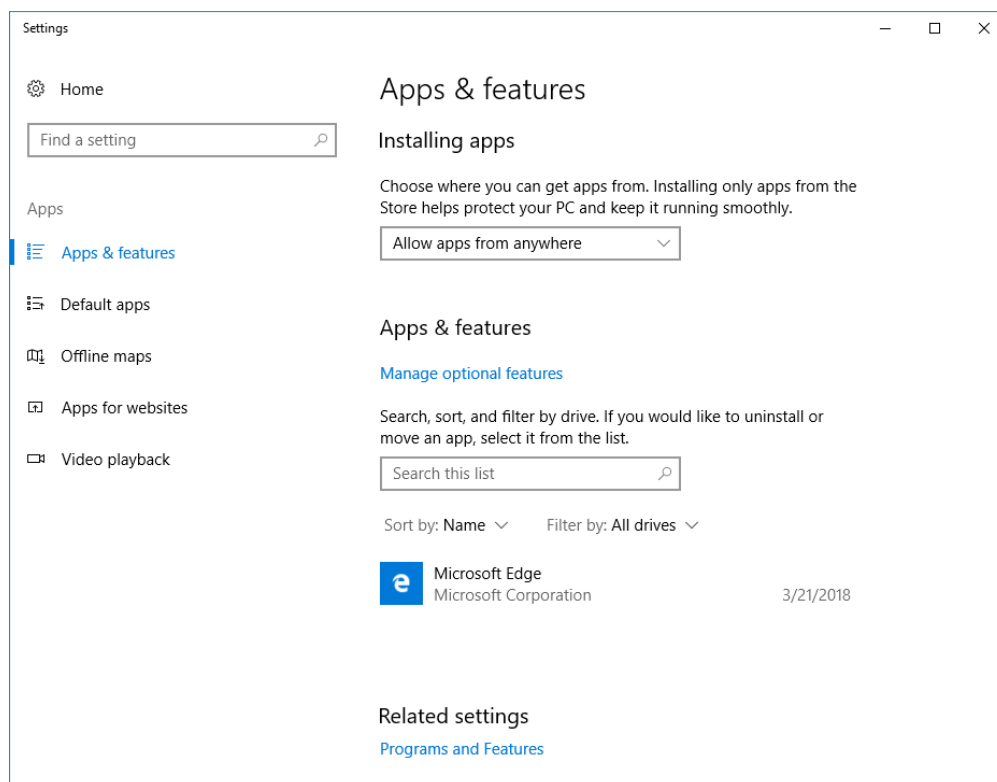
7 GROUP POLICIES

The beauty of Windows Enterprise is the possibility to set up important operating system settings using group policies. Open the group policy editor (run gpedit.msc).

7.1 DISABLE FIREWALL

Navigate to: *Computer Configuration->Windows Settings->Security Settings->Windows Defender Firewall with Advanced Security->Windows Firewall with Advanced Security – Local Group Policy Object*

### 7.1.1 Click on Windows Defender Firewall Properties
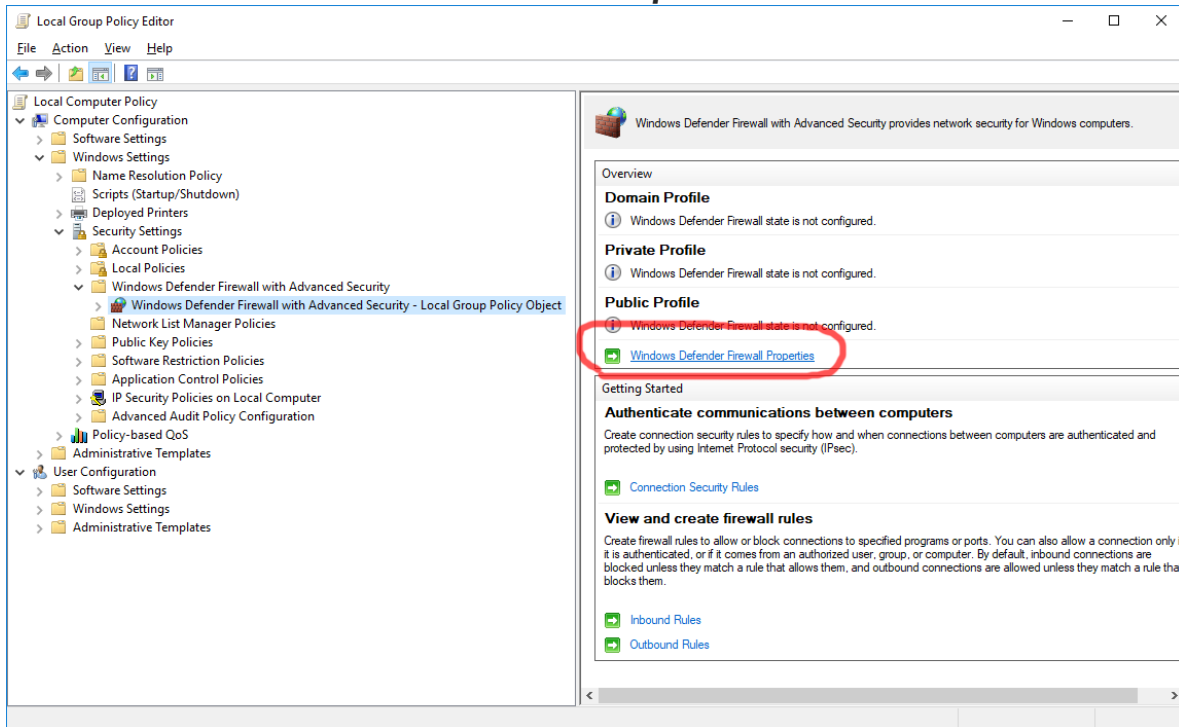
7.1.2 Firewall settings
Turn off the firewall and disable notifications for the Domain Profile, Private Profile and Public Profile.
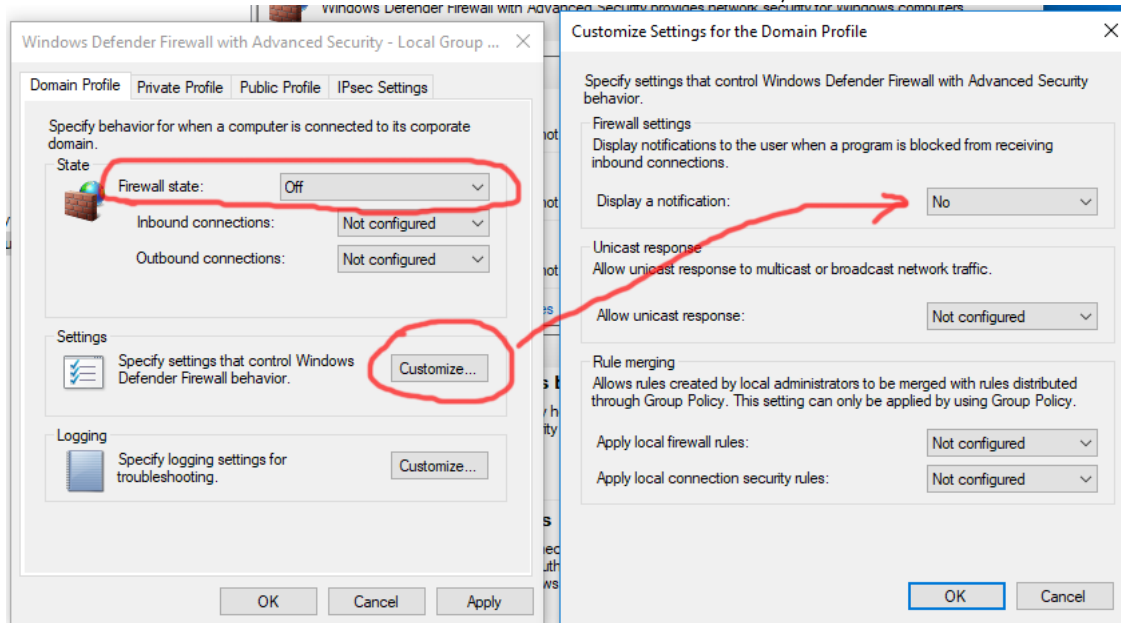
## 7.2 DISABLE NETWORK DISCOVERY SIDEBAR

The following setting will prevent the network discovery sidebar popping up every time a new network is found. This is to prevent situations as depicted in the image below.
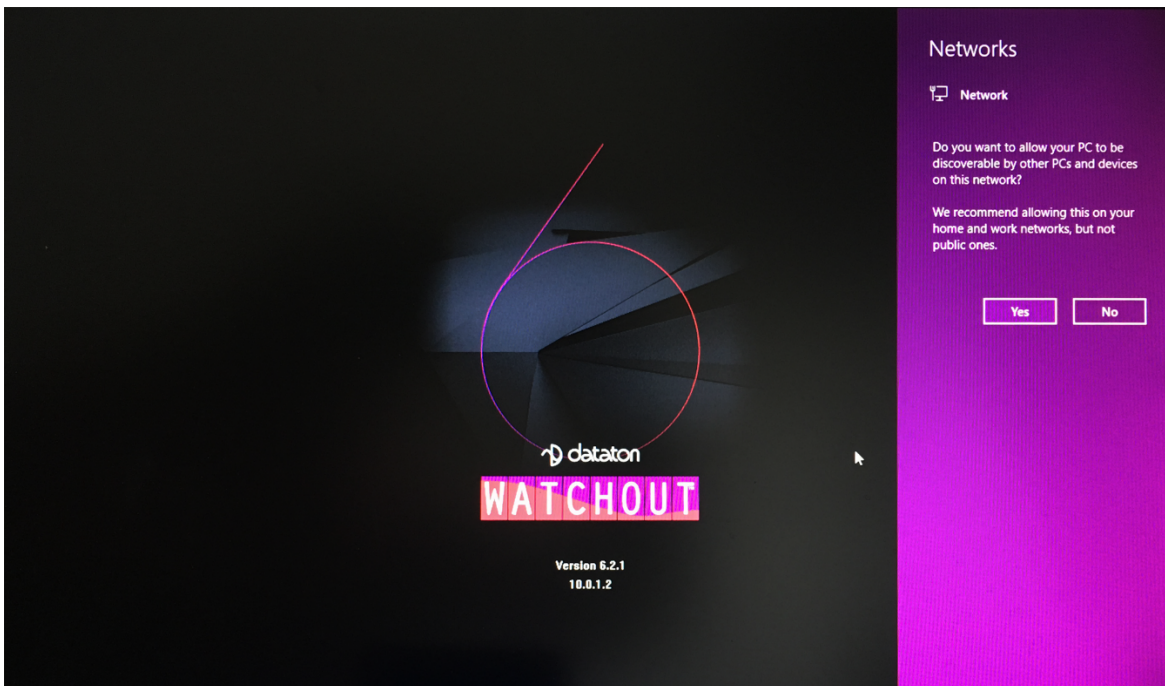
Navigate to: *Computer Configuration->Windows Settings->Security Settings->Network List Manager Policies*

Make sure the user cannot change the network location (public, work, etc).
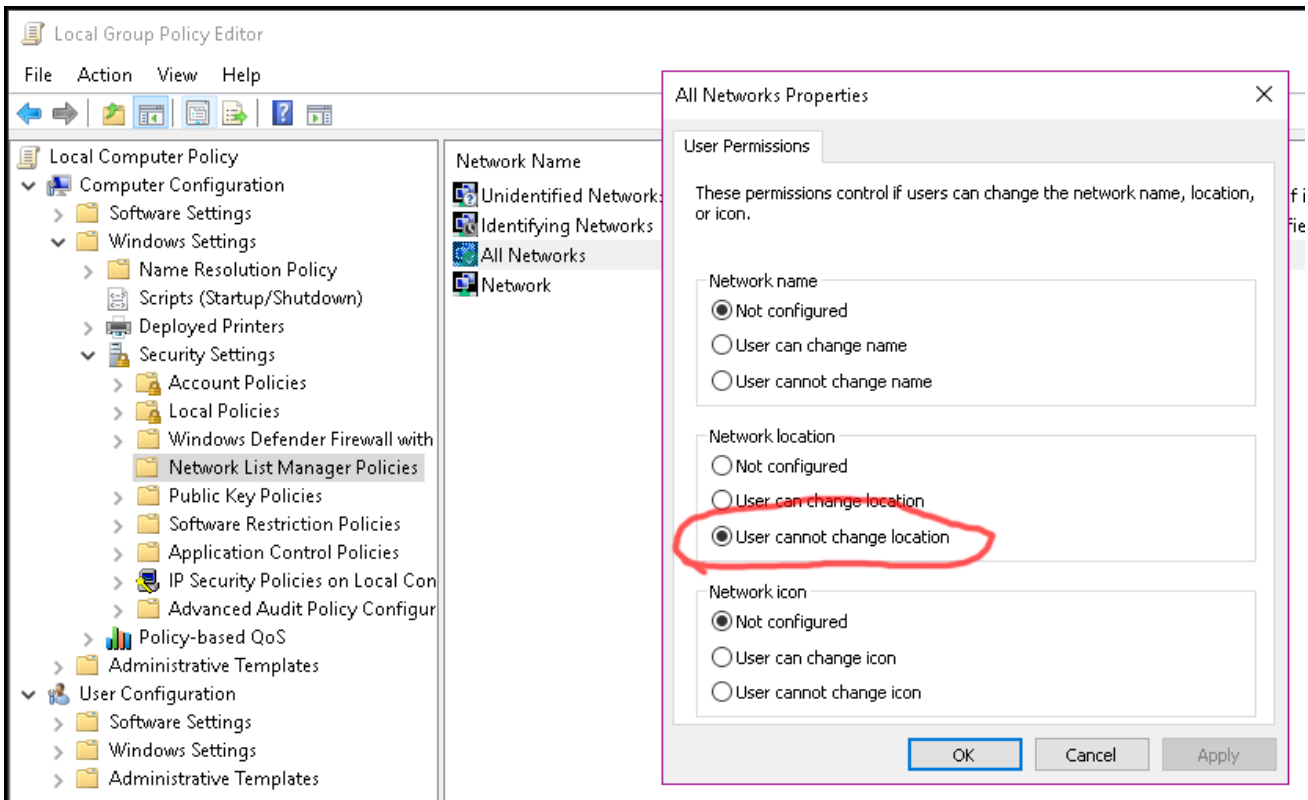
7.3 ADMINISTRATIVE TEMPLATES SYSTEM SETTINGS

Navigate to *Computer Configuration->Administrative Templates->System* and set the following settings:

7.3.1 Device Installation
7.3.1.1   Turn off "Found New Hardware" balloons during device installation = Enabled
7.3.2 Driver Installation
7.3.2.1   Turn off Windows Update device driver search prompt = Enabled
7.3.3 Logon
7.3.3.1   Turn off Windows Startup Sound = Enabled
7.3.3.2   Always wait for the network at computer startup and logon = Disabled
7.3.4 Power Management->Sleep Settings
7.3.4.1   Allow standby states (S1-S3) when sleeping (plugged in) = Disabled
7.3.4.2   Allow standby states (S1-S3) when sleeping (on battery) = Disabled
7.3.5 Recovery
7.3.5.1   Allow restore of system to default state = Disabled
7.3.6 System Restore
7.3.6.1   Turn off System Restore = Enabled

7.4 ADMINISTRATIVE TEMPLATES WINDOWS COMPONENT SETTINGS

Navigate to *Computer Configuration->Administrative Templates->Windows Components* and set the following settings:

7.4.1 Add features to Windows 10
7.4.1.1   Prevent the wizard from running = Enabled
7.4.2 AutoPlay Policies
7.4.2.1   Turn off Autoplay = Enabled
7.4.3 Biometrics
7.4.3.1   Allow the use of biometrics = Disabled
7.4.4 Cloud Content
7.4.4.1   Do not show Windows tips = Enabled
7.4.4.2   Turn off Microsoft consumer experiences = Enabled
7.4.5 Desktop Gadgets
7.4.5.1   Turn off desktop gadgets = Enabled
7.4.6 Search
7.4.6.1   Allow Cortana = Disabled
7.4.7 Store
7.4.7.1   Turn off the Store application = Enabled
7.4.8 Windows Defender Antivirus
7.4.8.1   Turn off Windows Defender Antivirus = Enabled
  7.4.8.2   Real-Time Protection
   7.5.8.2.1   Turn on process scanning whenever real-time protection is enabled = Disabled
   7.5.8.2.2   Turn on behavior monitoring = Disabled
   7.5.8.2.3   Turn off real-time protection = Enabled
   7.5.8.2.4   Monitor file and program activity on your computer = Disabled
7.4.9 Windows Hello for Business
7.4.9.1   Use Windows Hello for Business = Disabled
7.4.10 Windows Media Player
7.4.10.1   Prevent Automatic Updates = Enabled
7.4.10.2   Do Not Show First Use Dialog Boxes = Enabled
7.4.11 Windows Update
7.4.11.1   Do not display "Install Updates and Shut Down" option = Enabled
7.4.11.2   Configure Automatic Updates = Disabled
7.4.11.3   Do not connect to any Windows Update Internet locations = Enabled

7.5 USER ADMINISTRATIVE TEMPLATES SYSTEM SETTINGS

Navigate to *User Configuration->Administrative Templates->System* and set the following settings:

7.5.1   Ctrl + Alt + Del Options (only on display server)
    7.5.1.1   Remove Lock Computer = Enabled
    7.5.1.2   Remove Logoff = Enabled

7.6 USER ADMINISTRATIVE TEMPLATES WINDOWS COMPONENTS SETTINGS

Navigate to *User Configuration->Administrative Templates->Windows Components* and set the following settings:

7.6.1   File Explorer (only on display server)
    7.6.1.1   Turn off the caching of thumbnails in hidden thumbs.db files = Enabled
    7.6.1.2   Turn off the display of thumbnails and only display icons = Enabled
7.6.2   Network Sharing
    7.6.2.1   Prevent users from sharing files within their profile = Enabled

7.7 USER ADMINISTRATIVE TEMPLATES START MENU AND TASKBAR SETTINGS

Navigate to: *User Configuration->Administrative Templates->Start Menu and Taskbar* and set the following settings:

7.7.1   Remove Notifications and Action Center = Enabled
7.7.2   Turn off all balloon notifications = Enabled
7.7.3   Notifications
    7.7.3.1   Turn off toast notifications = Enabled
    7.7.3.2   Turn off tile notifications = Enabled

Note that group policies can easily be backed up and copied between servers. Computer configuration settings are stored at:

%systemroot%\system32\grouppolicy\machine grouppolicy\machine

User configuration settings are stored at:

%systemroot%\system32\grouppolicy\user grouppolicy\user

To apply the group policies simply **reboot**.

8 INSTALL ALL DRIVERS

Install all drivers needed for your system to operate. At this point Windows update is disabled and an ethernet connection can be plugged in. Drivers should be downloaded on a separate machine in order to minimize the exposure to the internet since most security features are disabled.

- GPU
- Network
- Chipset
- SSD drivers
- Video Capture
- Audio
- USB
- Etc.

9 INSTALL WATCHOUT

Preferably install WATCHOUT on a different drive or partition than the system. For example: D:\WATCHOUT.
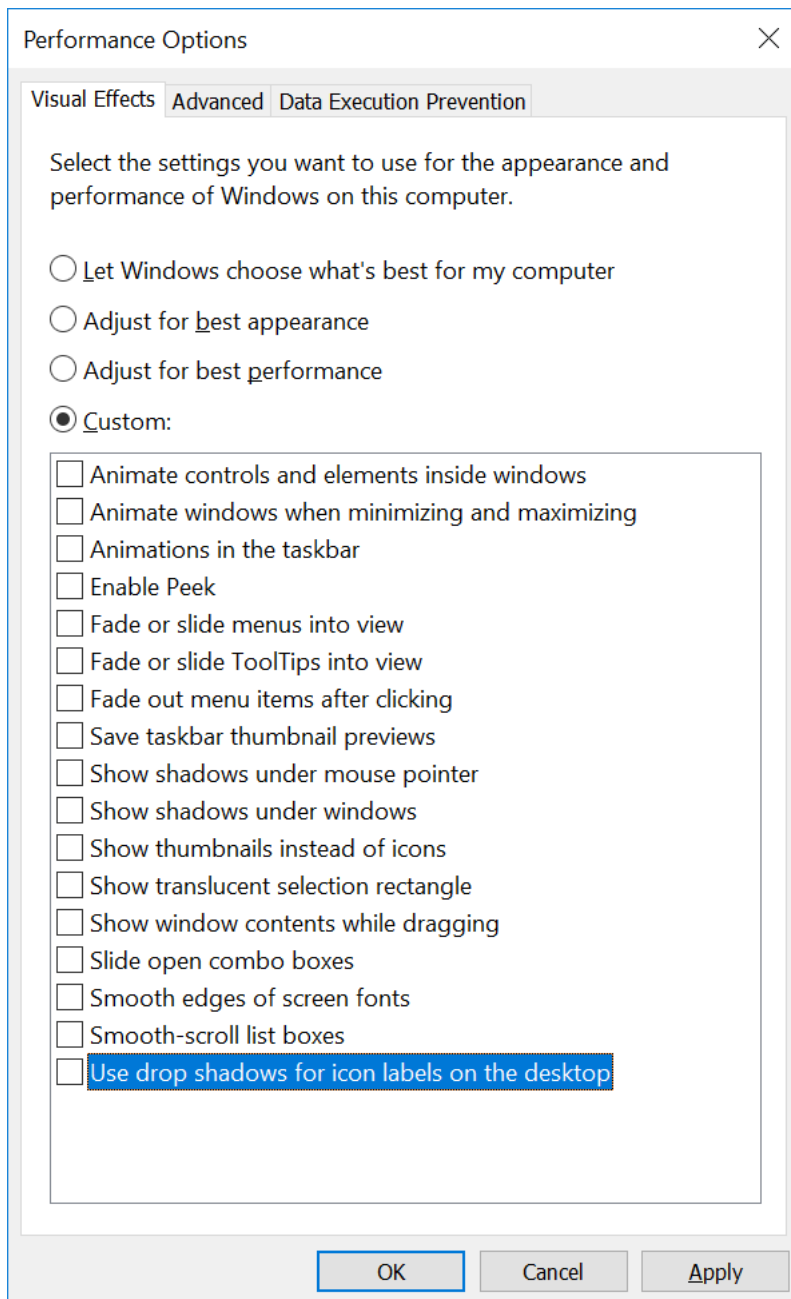
10 WINDOWS SETTINGS

10.1 AUTOPLAY

Set "Use AutoPlay for all media and devices" to off.

10.2 AUTOLOGIN

Run **netplwiz**, uncheck "Users must enter a user name and password to use this computer."

10.3 ADVANCED SYSTEM SETTINGS: PERFORMANCE

Disable all visual effects.

Performance Options   ✕

Visual Effects | Advanced | Data Execution Prevention

Select the settings you want to use for the appearance and performance of Windows on this computer.

○ Let Windows choose what's best for my computer

○ Adjust for best appearance

○ Adjust for best performance

◉ Custom:

- [ ] Animate controls and elements inside windows
- [ ] Animate windows when minimizing and maximizing
- [ ] Animations in the taskbar
- [ ] Enable Peek
- [ ] Fade or slide menus into view
- [ ] Fade or slide ToolTips into view
- [ ] Fade out menu items after clicking
- [ ] Save taskbar thumbnail previews
- [ ] Show shadows under mouse pointer
- [ ] Show shadows under windows
- [ ] Show thumbnails instead of icons
- [ ] Show translucent selection rectangle
- [ ] Show window contents while dragging
- [ ] Slide open combo boxes
- [ ] Smooth edges of screen fonts
- [ ] Smooth-scroll list boxes
- [ ] Use drop shadows for icon labels on the desktop

[OK]   [Cancel]   [Apply]

10.4 ADVANCED SYSTEM SETTINGS: REMOTE

Uncheck "Allow Remote Assistance connections to this computer".

10.5 CHOOSE OR CUSTOMIZE A POWER PLAN

- Choose "High performance" power plan
- Turn off hard disk after: 0 (Never)
- USB selective suspend setting: Disabled
- Turn off display after: 0 (Never)

10.6 INTEL RAPID STORAGE TECHNOLOGY (IF AVAILABLE)

Intel will reduce PCIe link speed of the SSD if the rest of the system is under a low load. HAP playback requires high SSD throughput but uses very little CPU. Reducing the link speed will affect HAP performance so keep it at a maximum by disabling link power management.

- Performance: Disable link power management
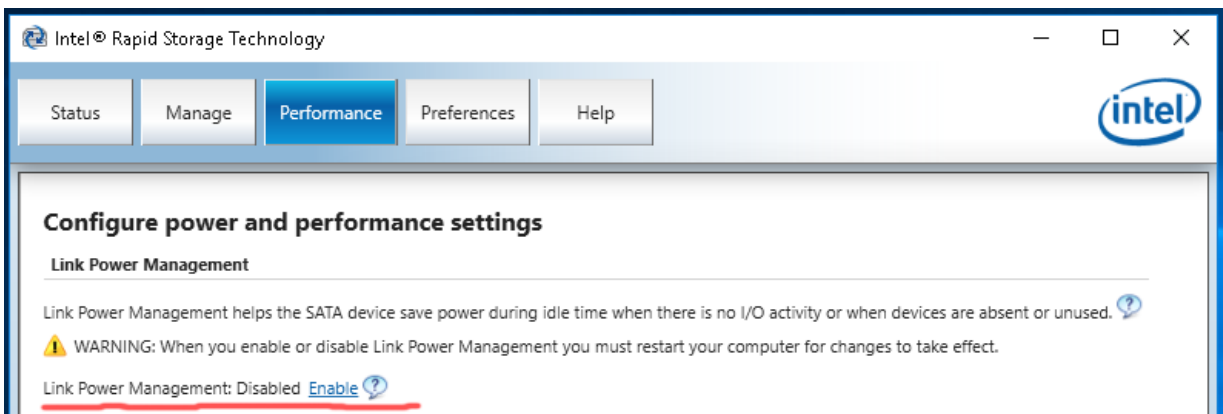
10.7 SYSTEM SOUNDS

Change Sound Scheme to "No Sounds".

10.8 USER ACCOUNT CONTROL SETTINGS (UAC)

Set it to never notify (lowest setting).

10.9 DEFRAGMENT AND OPTIMIZE DRIVES

Disable automatic schedule of disk optimization.
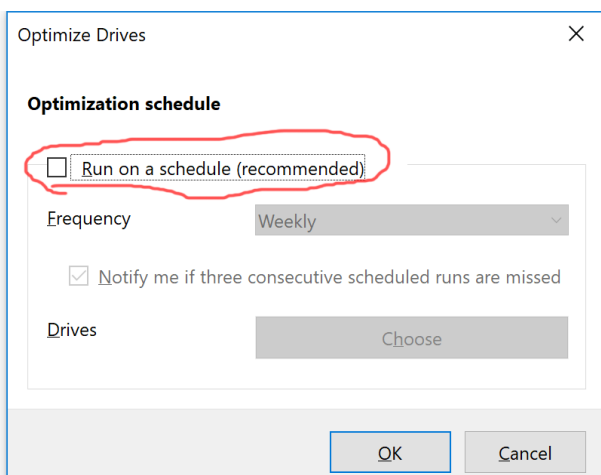
SSD optimizations are important but under controlled forms. This document will later describe how to run optimizations upon logon.
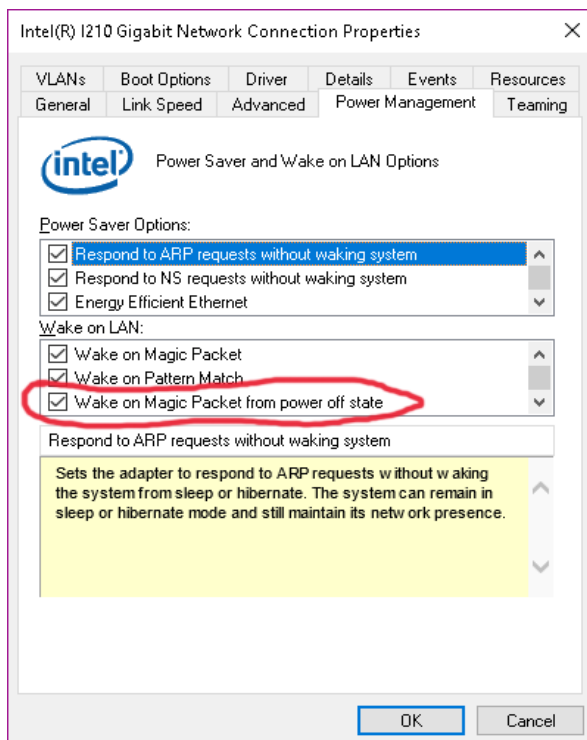
10.10 NETWORK

Disable everything except "Internet Protocol Version 4 (TCP/IPv4)" on all network adapters.
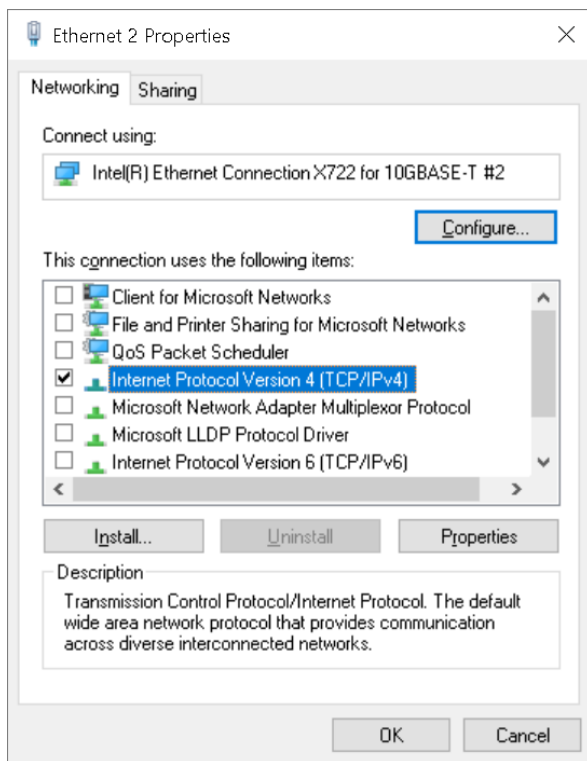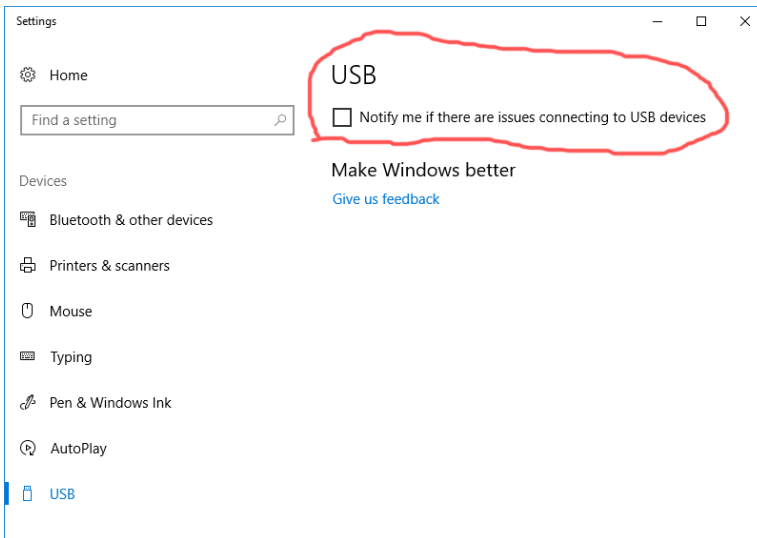

10.11 WAKE-ON-LAN

Enable Wake-On-Lan (WOL) from Device Manager->Network Adapters->Adapter properties.

10.12 USB

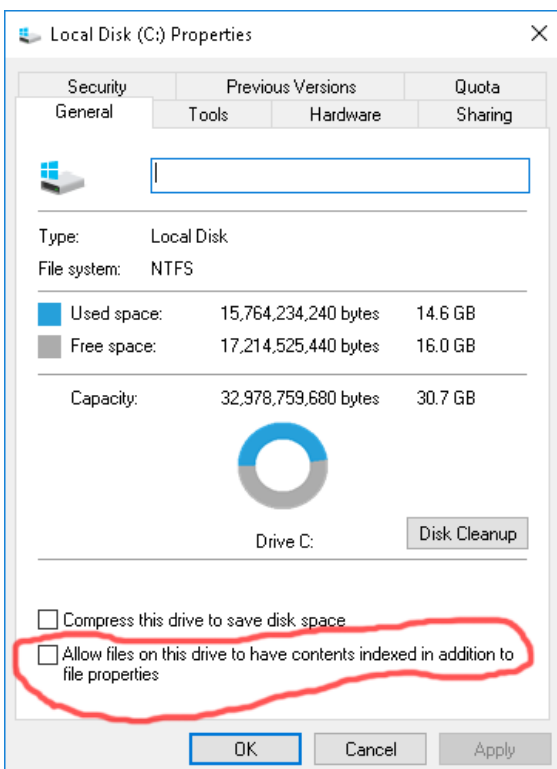Disable USB notifications.

10.13 TASKBAR SETTINGS

- Turn off "Show badges on taskbar buttons".
- Turn off "Show contacts on the taskbar".

10.14 TASK MANAGER: STARTUP

Disable Windows Defender notification icon and other applications that can steal focus from WATCHOUT.

10.15 INDEXING

Disable disk indexing for all drives.

11 SERVICES

Run **msconfig**, in the System Configuration Window, select the Services tab. Disable the following services:

- **All Bluetooth services**
- Geolocation Service
- **All Hyper-V services**
- Infrared Monitor service
- Intel(R) Content Protection HDCP Service
- Intel(R) Content Protection HECI Service
- Microsoft Account Sign-In Assistant
- NVIDIA Telemetry Container (if available)
- Phone Service
- Print Spooler
- Printer Extensions and Notifications
- **All Remote … services**
- Retail Demo Service
- Telephony
- Touch Keyboard and Handwriting Panel Service
- WalletService
- Windows Backup
- Windows Biometric Service
- Windows Defender Network Inspection Service
- Windows Error Reporting Service
- Windows Insider Service
- Windows Media Player Network Sharing Service
- Windows Mobile Hotspot Service
- All Windows Push Notifications
- Windows Remote Management
- Windows Search
- Windows Store Install Service
- Windows Update
- **All Xbox services**

12 REGISTRY SETTINGS

Run **regedit** and navigate to the following settings. Some values may not exist and will need to be created.

HKLM = HKEY_LOCAL_MACHINE

12.1 MEDIA REGISTRY SETTINGS

Increase DirectShow thread priority:

HKLM\SOFTWARE\Microsoft\DirectShow\ThreadPriority = highest, HEX: F9 (DWORD)

Increase Maximum Multimedia CPU usage:

HKLM\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Multimedia\SystemProfile\SystemResponsiveness = HEX: 5 (leave 5% CPU for background tasks instead of 20%)

12.2 GPU SETTINGS

Force GPU PCIe link speed to prevent interference with audio (Important for some X99 motherboards). Some AMD driver versions from 2018 have a bug which **might crash windows on startup** using this setting. If this happens, boot in failsafe mode and delete this registry value.

HKLM\SYSTEM\CurrentControlSet\Control\Class\
4D36E968-E325-11CE-BFC1-08002BE10318\0000\ForcePcieLinkSpeed = highest, HEX: 3 (DWORD)

If there have been multiple GPUs installed then set the key for all 0000, 0001, 0002 etc. subtrees.

It takes time to change display mode on servers with multiple high-resolution outputs (especially if using a sync card). With Windows default settings, the GPU might timeout and cause a bluescreen. To counter this, increase the timeout values as below.

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\GraphicsDrivers\TdrDelay should be increased to 15 seconds (default is 2 seconds, decimal value DWORD)

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\GraphicsDrivers\TdrDdiDelay should be increased to 60 seconds (default is 5 seconds, decimal value DWORD)

12.3 OTHER SETTINGS

Disable Logon/Welcome screen:

HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows Embedded\EmbeddedLogon\HideAutoLogonUI should be set to 1

Change CPU priority (mainly for production PC/WATCHMAKER):

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\PriorityControl Win32PrioritySeparation (set it to HEX: 28 so WATCHMAKER get equal priority even if not in focus).

HEX 28 is binary 10 10 00, shorter fixed length intervals where background and foreground get the same amount of processor time. This setting ensures that WATCHOUT's CPU time doesn't decrease when the application has lost focus.

Disable desktop scaling as this will cause alignment issues with the Remote Access feature in WATCHOUT.
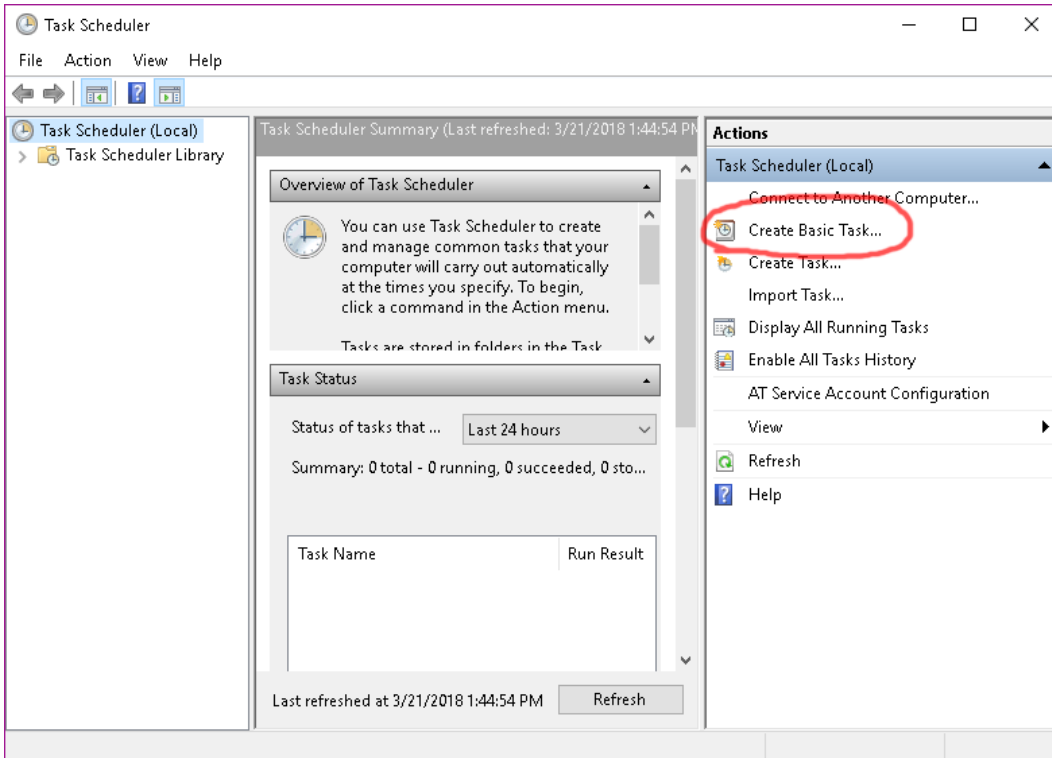
HKEY_CURRENT_USER\Control Panel\Desktop\Win8DpiScaling should be set to 1

HKEY_CURRENT_USER\Control Panel\Desktop\LogPixels should be set to 96 (Decimal DWORD) which corresponds to 100 % scaling (96 DPI).
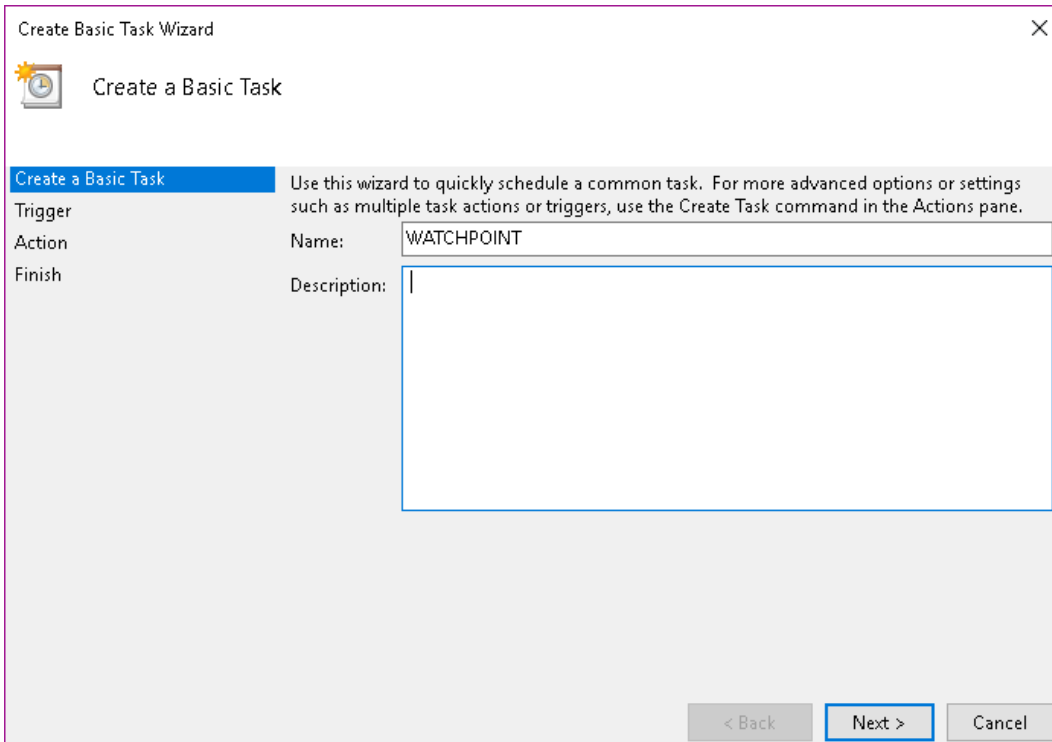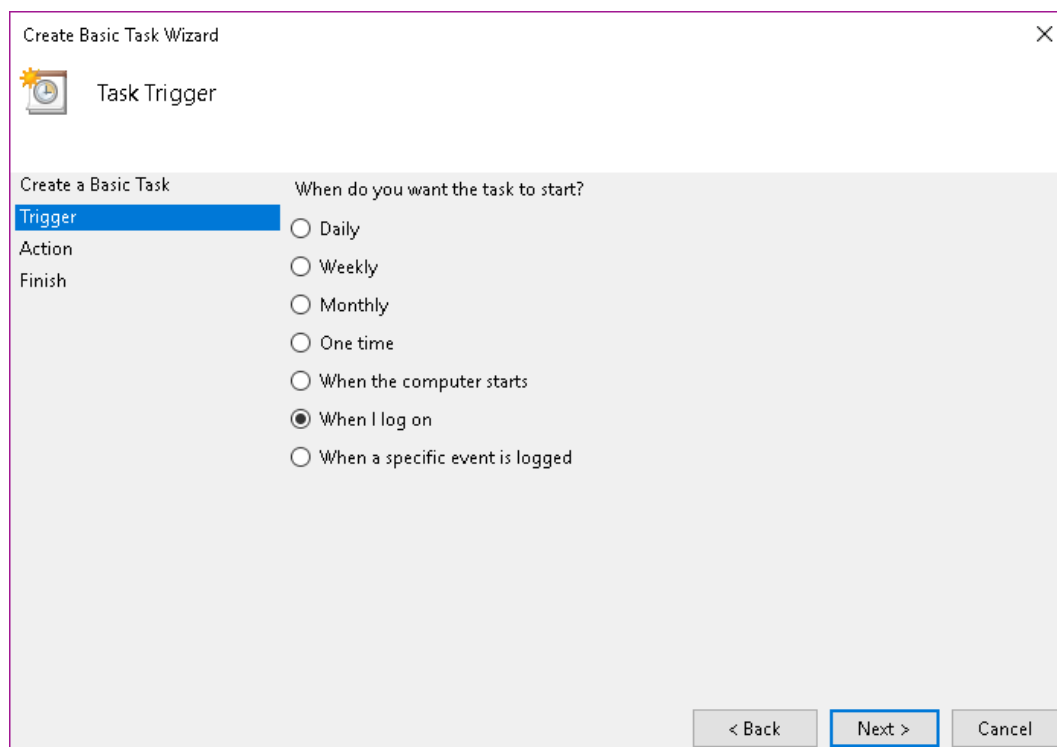
13 TASK SCHEDULER

13.1 AUTO-START WATCHOUT

WATCHOUT requires elevated privileges (run as admin) for remote software upgrades. To set up WATCHPOINT to auto-start, create a scheduled task for it.
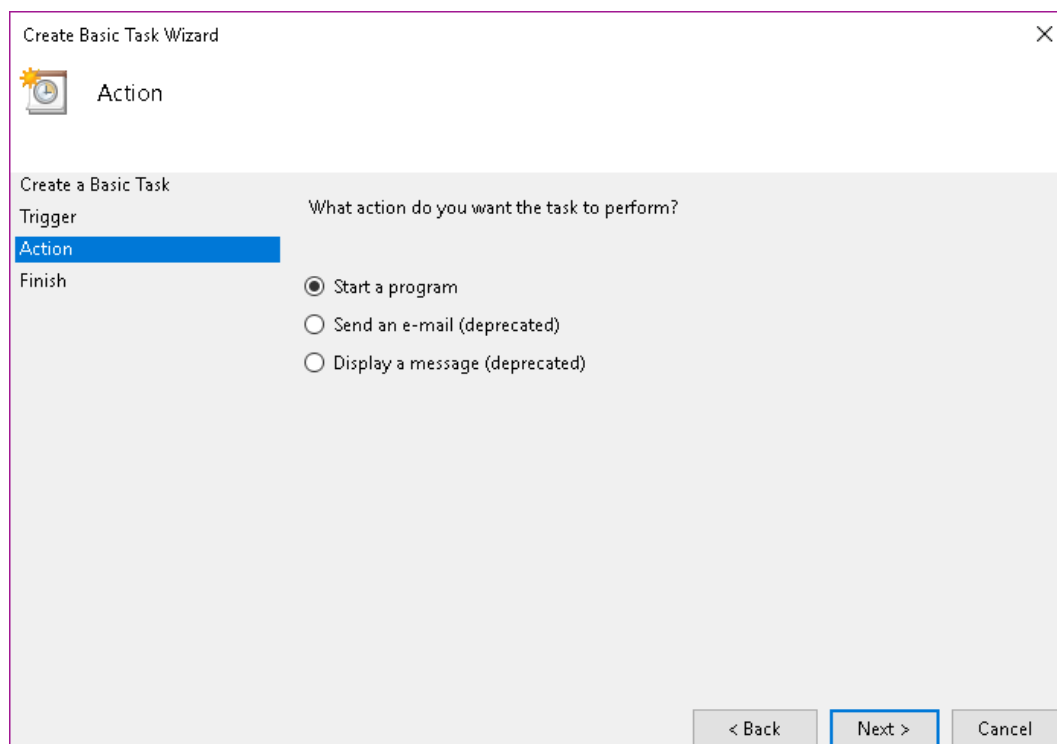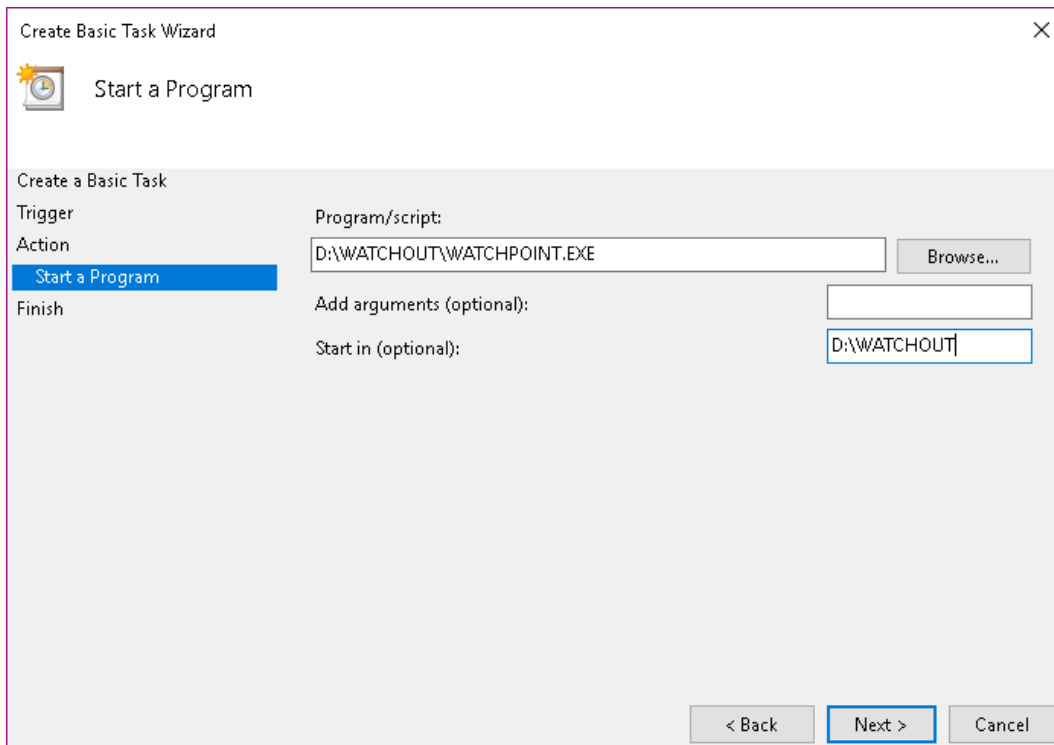

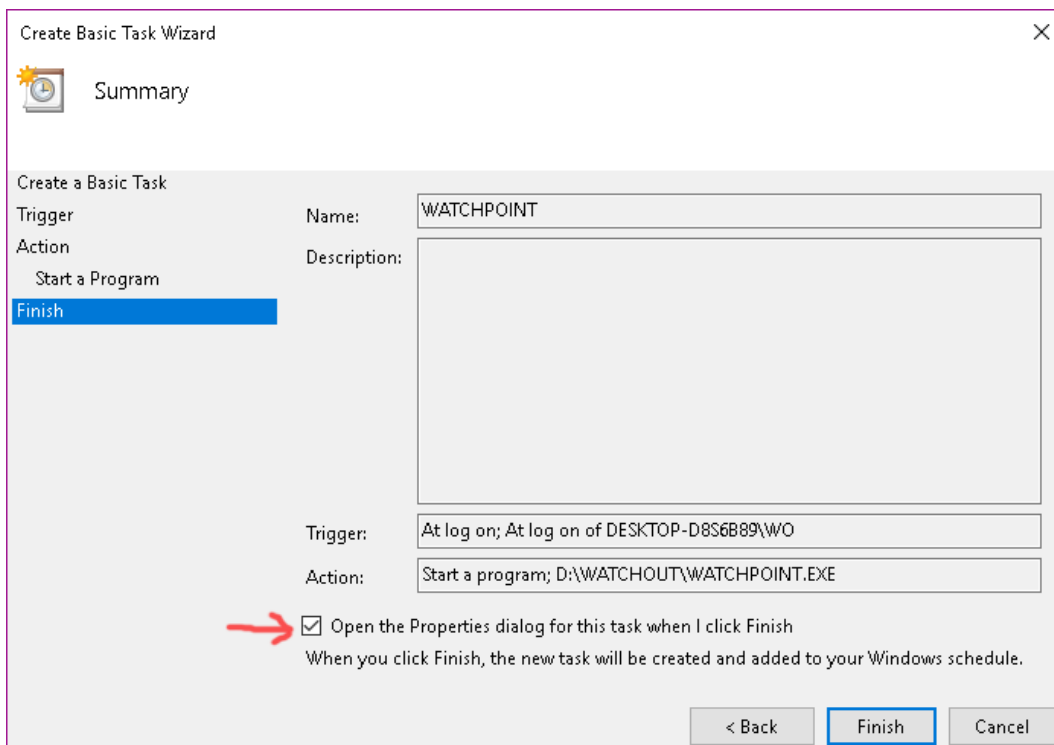Name the task.

Set the task to run upon logon.
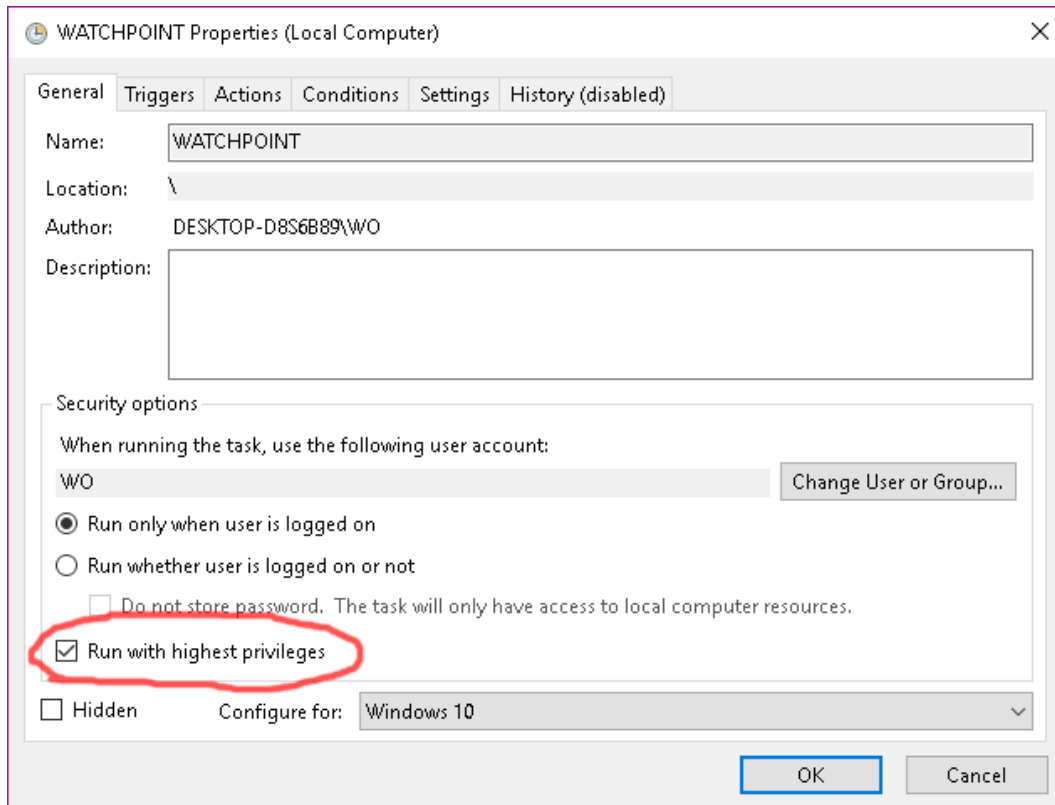

Chose to start a program.

Browse WATCHPOINT.EXE and set up the working directory (Start in).

Before finishing, check the "Open the Properties dialog for this task when I click Finish".

Now you've reached the important part. In order to run in elevated mode, "Run with highest privileges" must be checked. Press OK.
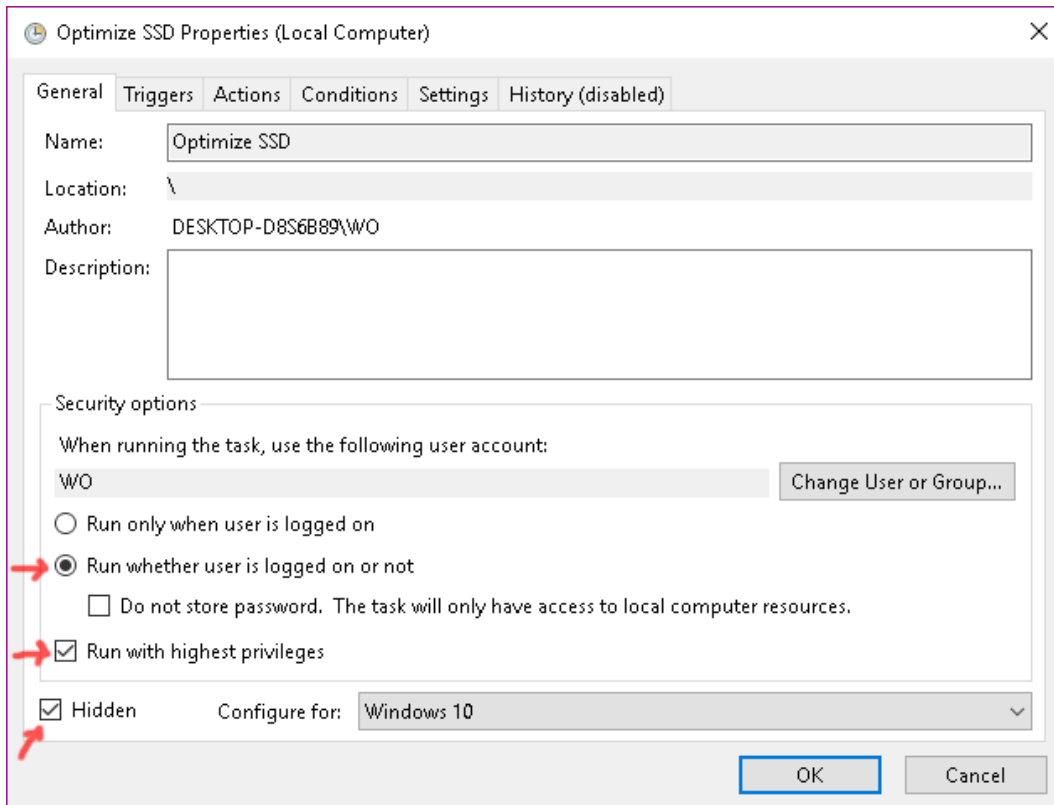

13.2 AUTO-START SSD OPTIMIZATION

Perform the same steps as when creating the auto-start task for WATCHOUT. The target program in this case is different, as is the arguments field.
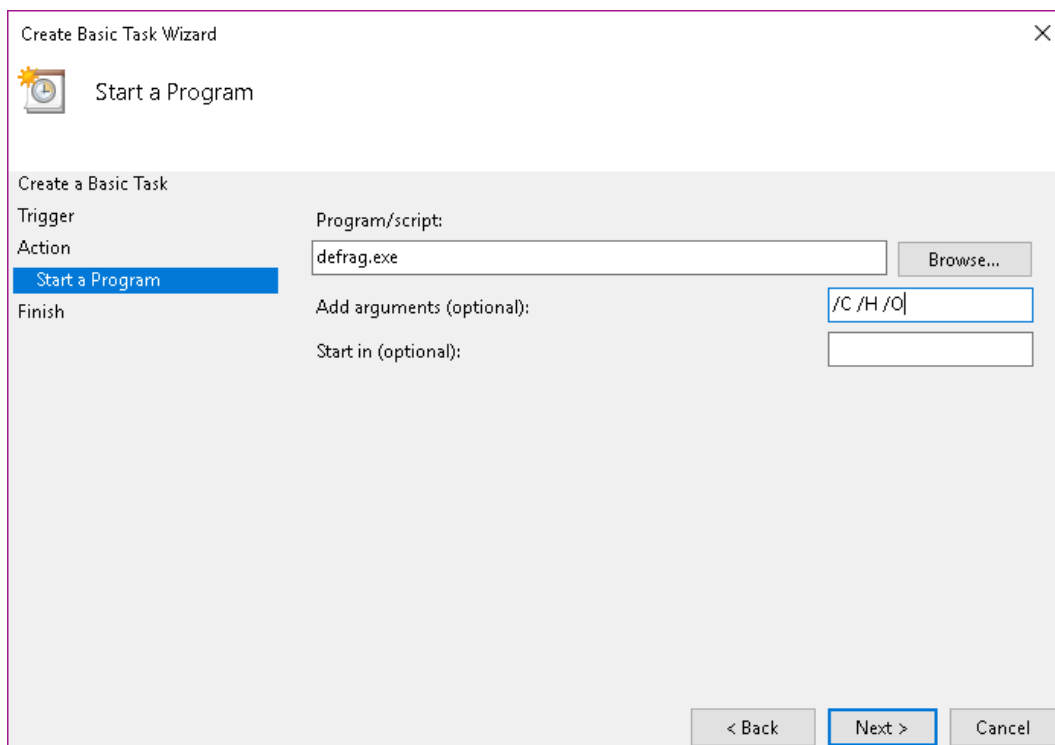
Finally, to prevent the defrag cmd window showing up every time Windows starts, make it invisible by setting the marked settings below.

Plug in the network cable, reboot and you are ready to make astonishing shows.