Operating System Telemetry

Configuring privacy protection in Windows 10

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Public

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Windows 10

- Change: “Windows as a Service”
  - Feature Upgrades: Rolling updates 2x/year (spring, fall)
  - No “next” Windows version
  - No more Service Packs
- Primary business: sale of services
  - Office 365, OneDrive, games, apps, etc.
  - Still sale of software
- Additionally: Advertising
  - Like Apple, Google, etc.
- Fewer options to configure telemetry/tracking on cheaper editions
  - Enterprise – Edu – Pro – Home (least)
- Not “privacy by design/default”

Why is this important?

- Concerns with regards to Privacy Protection
  - Tracking of users → Privacy
  - Telemetry → sensitive/personal information transferred to MS (servers outside organisation)
  - No transparency (What is tracked, why, where is it transferred to …)
  - In professional use: Organisation is data controller and therefore legally responsible for transmission)
- Guiding question
  - Can Windows 10 be used in public administrations?
  - TLDR: Yes, but tracking/telemetry has to be turned off
  - Recent EU court rulings have voided Privacy Shield → probably not anymore
- Scope
  - Office/Administration PCs/Laptops
  - Windows 10 Enterprise 1909

Problem Fields, Agenda

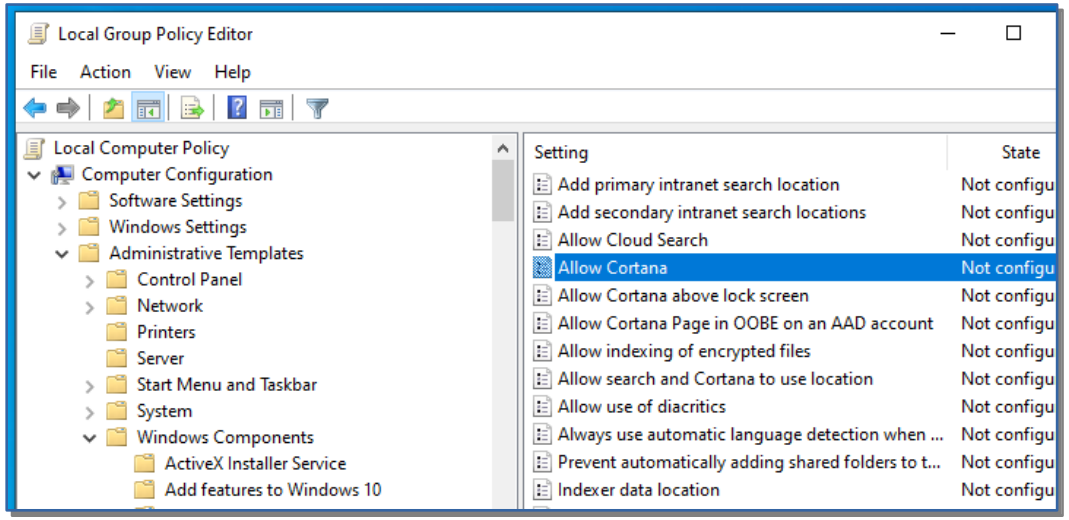
- Cortana
- Taskbar web search
- Advertising ID
- Updates
- Microsoft Account
- Telemetry
- Former issues:
  - WLAN password sharing function (WiFi-Sense)
  - Disabled for encrypted WLANs since 1607

Cortana: Features – Issues – Recommendation

- Virtual Assistant
  - Voice interface to search, notes, etc.
    - Like Google, Siri, Alexa, …
  - Also for Android (needs MS account to sync)
- Problems
  - Voice samples send to MS for analysis
  - May leak personal/sensitive/confidential information
  - Can interact to voice commands even when screen/system is locked, tracks all the time
- Recommendation: Deactivate

Cortana: Deactivation

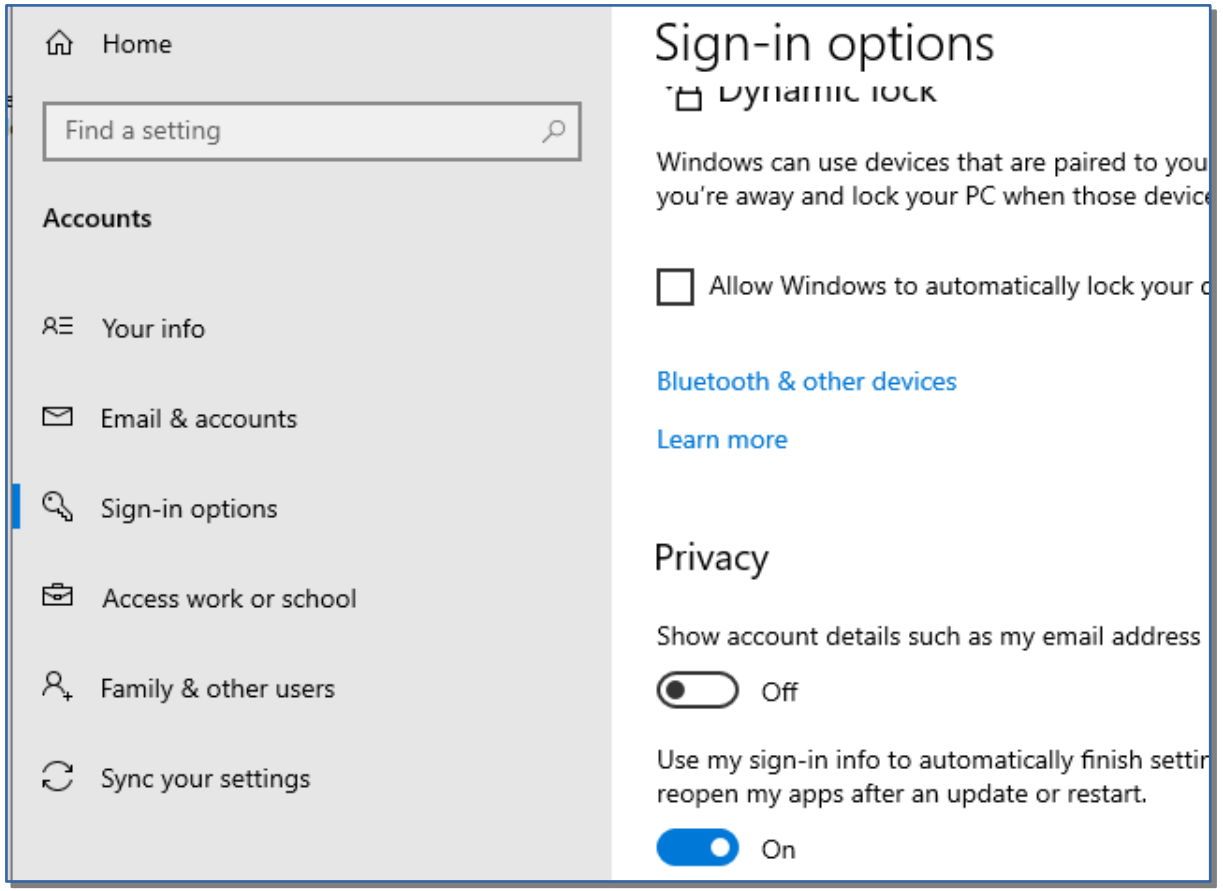
- Group Policy (Enterprise, Edu, Pro):
  - Computer Configuration→Administrative Templates→Windows Components→Search →Allow Cortana
    - Set to „Disabled“



- Registry edit:
  - Key: `HKLM\Software\Policies\Microsoft\Windows\Windows Search`
  - Value: `AllowCortana = 0` (DWORD)
  - Per user key: `HKCU\SOFTWARE\Policies\Microsoft\Windows\Windows Search`

Cortana: Email address control

- Don‘t show email address on lock screen when using MS account



Taskbar web search: Features – Issues – Recommendation

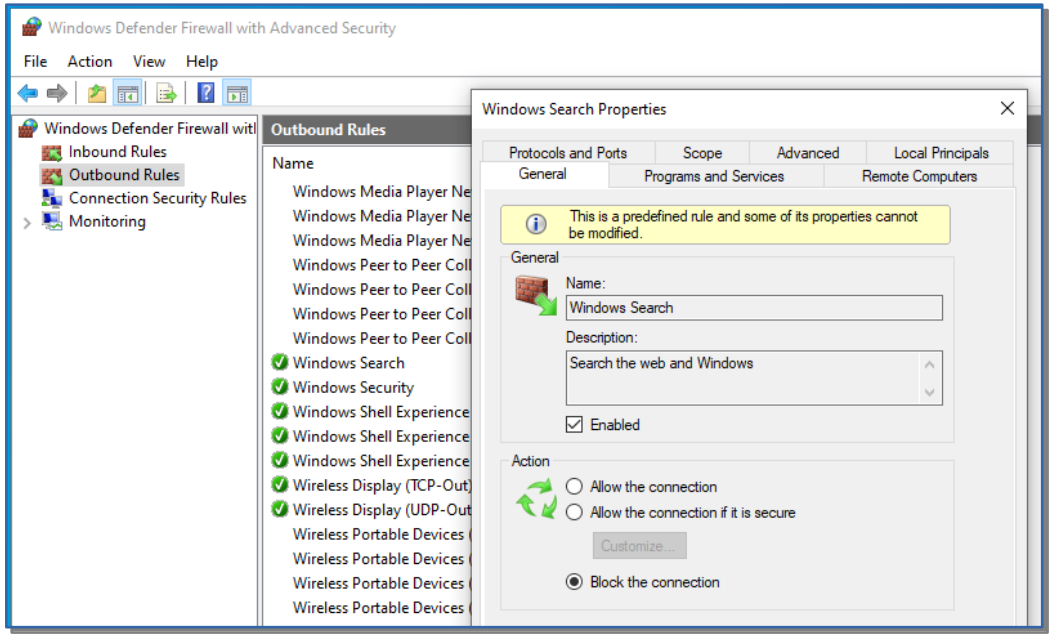
- Web search
  - Hitting the Windows + S key or when typing in taskbar search window
  - Incremental web search as in browsers
  - I.e. sends search term while you type to the search engine which offers suggestions
  - Here: Edge & Bing
- Problem
  - Advertising/profiling through search engine
  - Hardcoded - can‘t choose other search engines or browsers
- Recommendation: Deactivate
  - Registry (recommended)
  - Or blocking in the local firewall

Taskbar web search: Deactivation (1)

- Registry keys change with Windows 10 Feature Upgrades
- Versions 1803 – 1909:
  - Key: `HKCU\Software\Microsoft\CurrentVersion\Search`
  - Values:
    - `BingEnabled = 0` (DWORD)
    - `CortanaConsent = 0` (DWORD)
- Versions 2004 – ??:
  - Key: `HKLM\Software\Policies\Microsoft\Windows\Windows Search`
  - Value: `ConnectedSearchUseWeb = 0` (DWORD)
  - Enterprise & Edu only

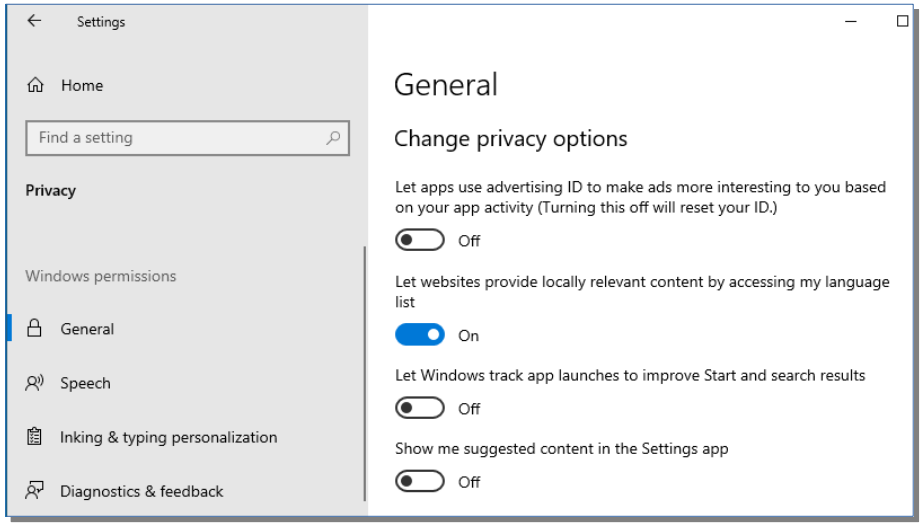
Taskbar web search: Deactivation (2)

- Through personal firewall
  - Powershell or cmd.exe (as admin):
    - `netsh advfirewall firewall add rule name="Block Cortana Outbound Traffic“ dir=out action=block program=“%windir%\systemapps\Microsoft.Windows.Cortana_cw5n1h2txyewy\SearchUI.exe" enable=yes profile=any`
- GUI:
  - Settings →
  - „Windows Defender with
  - Advanced Security“

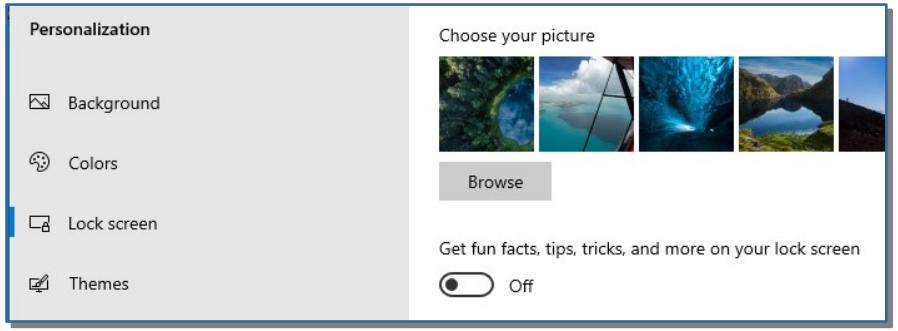


Advertising (ID): Issues & Recommendations

- Allows cross device tracking
- Deactivate
- Keep only language access



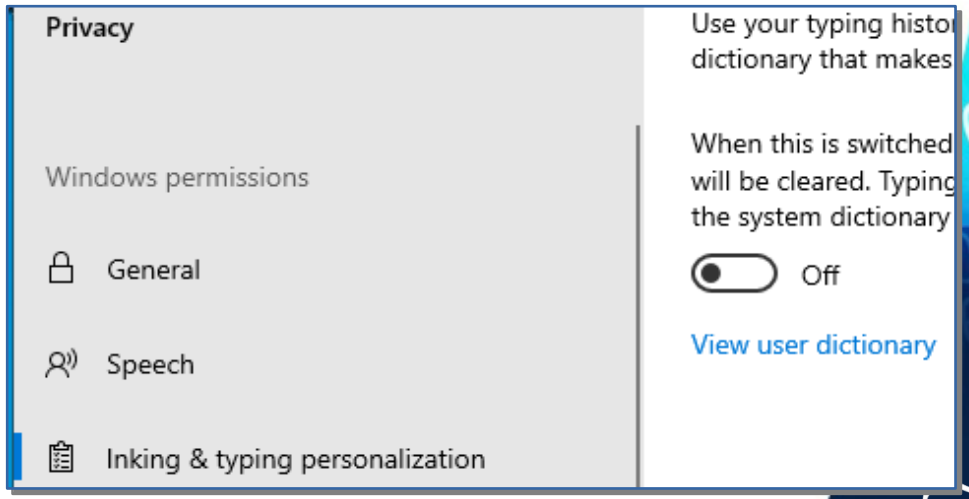
- Also turn off additional information on the lock screen



Advertising: Speech & Inking

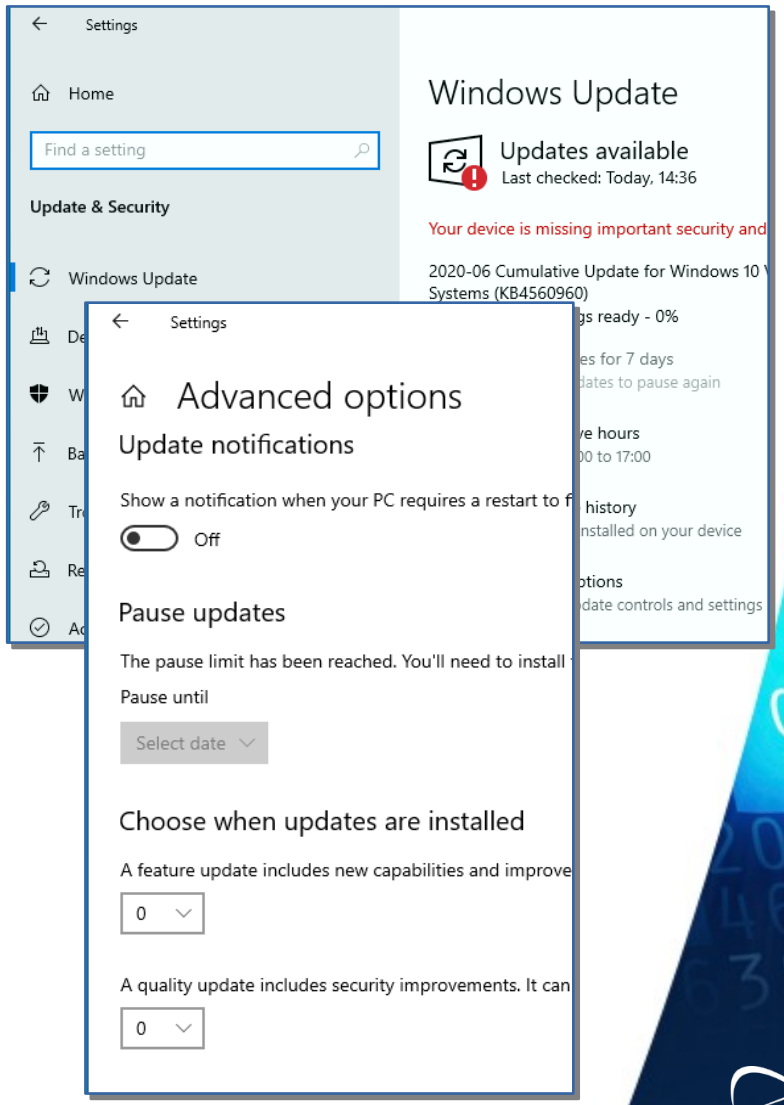
- Online Speech recognition
  - Uploads voice samples to MS cloud
    - Apps only: Cortana & dictation
    - Not the Windows voice recogniation
  - Some users may depend on it!
    - Disabilities?

- Inking & typing
  - Uploads handwriting samples to MS cloud
  - If turned off, local handwriting dict still works
  - Not needed, especially if no supporting hardware present



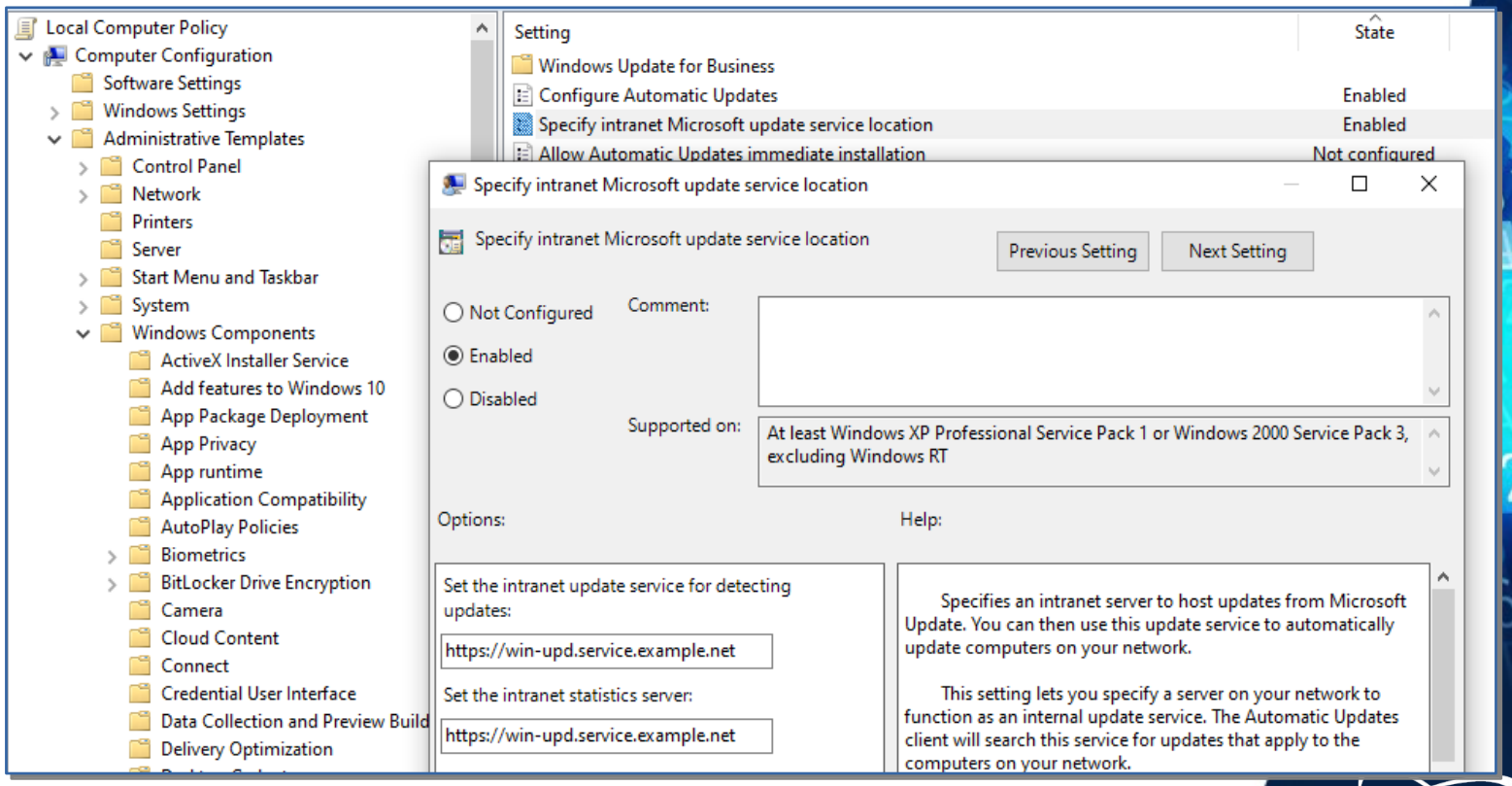
Updates

- Installing updates can‘t be turned off
- Feature Upgrades
  - Require maintenance work to adjust to personal preferences
    - Can be hold back up to one year
- Quality (Security) Updates
  - Install as fast as you can!
  - If stability is critical, wait a few days to see if MS pulls back an update
  - Can be delayed up to one month
- Reboots can be delayed until after work hours



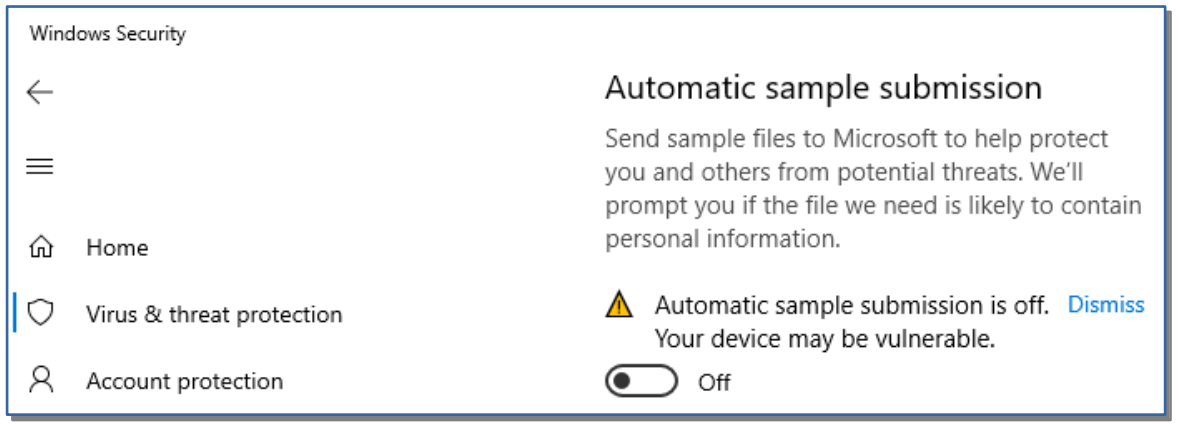
Updates: Update server

- More options with update server managed by the organisation
  - WSUS or Endpoint Manager
  - GPO object
  - Enterprise & Edu only



Updates: Windows Defender

- Windows Defender
  - Needs regular (signature) updates
  - Also uploads files assessed as suspicious
  - May process and upload personal/sensitive/confidential information/files
- Recommendation:
  - Turn off **automatic** sample submission
  - Settings → Update & Security → Virus & threat protection

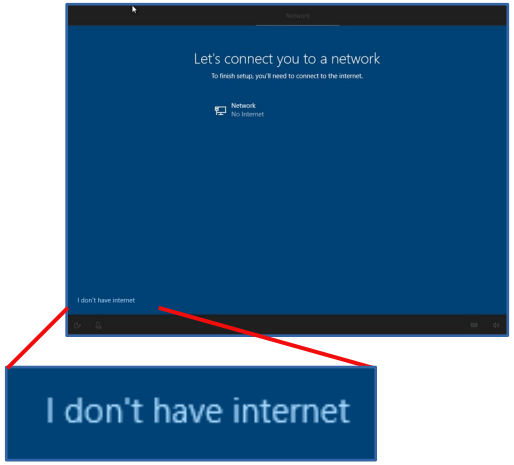


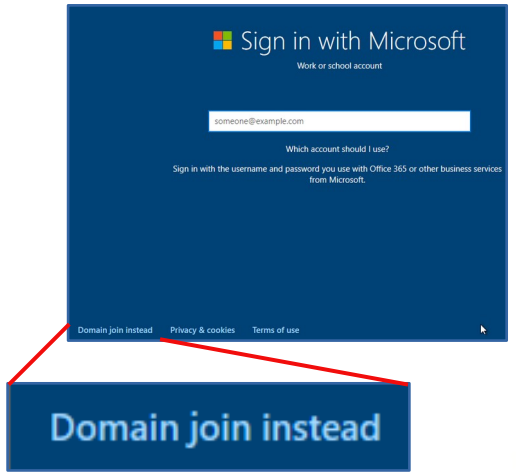
Defender Sample Submission Complete Deactivation

- Per registry key
  - `HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Windows Defender\Spynet`
  - Values:
    - `SubmitSamplesConsent = 2 (DWORD)`
    - `SpynetReporting = 0 (DWORD)`
- Per GPO:
  - `Computer Configuration → Administrative Templates → Windows Components → Windows Defender → MAPS`
    - `Send file samples when further analysis is required`
    - Set to `Enabled`
    - Select `Never send`

Local Account vs. Microsoft Account

- Default:
  - Use of MS (Cloud) account(s)
  - Almost hidden option to use local account
- Features:
  - (+) Single-sign-on to OS and Cloud
  - (+) Enables restore of OS license
  - (-) Makes tracking easier
  - (-) Password transferred in clear text to MS (once)
- Recommendation:
  - Install with local account
  - Add (cloud) accounts later if needed
  - Store/Cloud accounts don‘t need to be the same as host account





Any questions so far?

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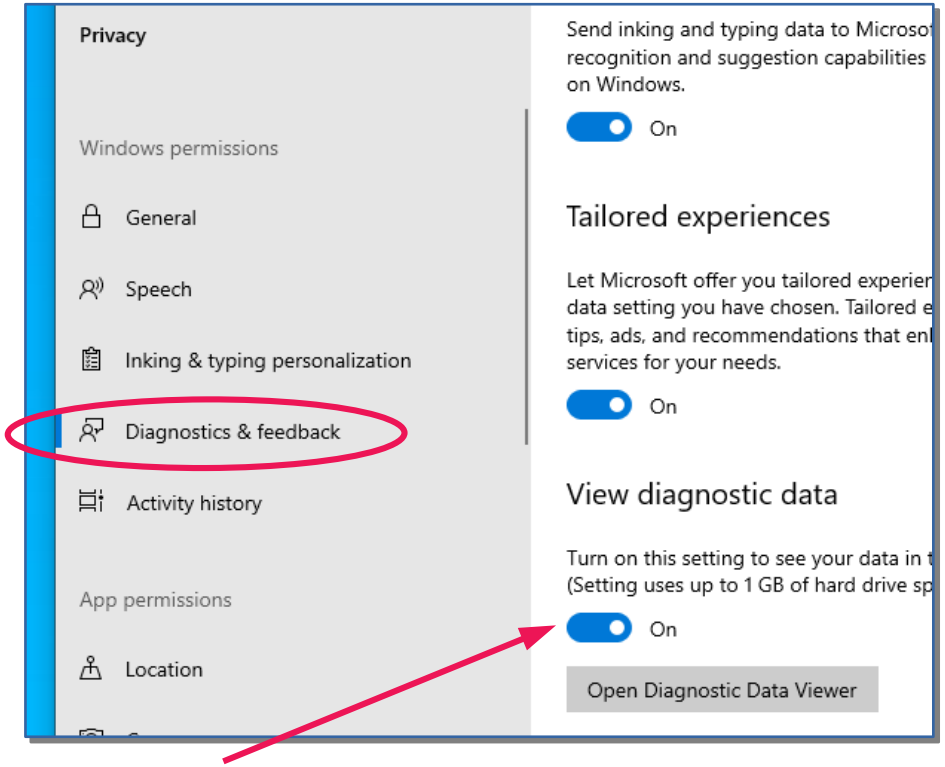
The research leading to these results has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 731122 (GN4-2).

Telemetry: What it is – What it does – Issues

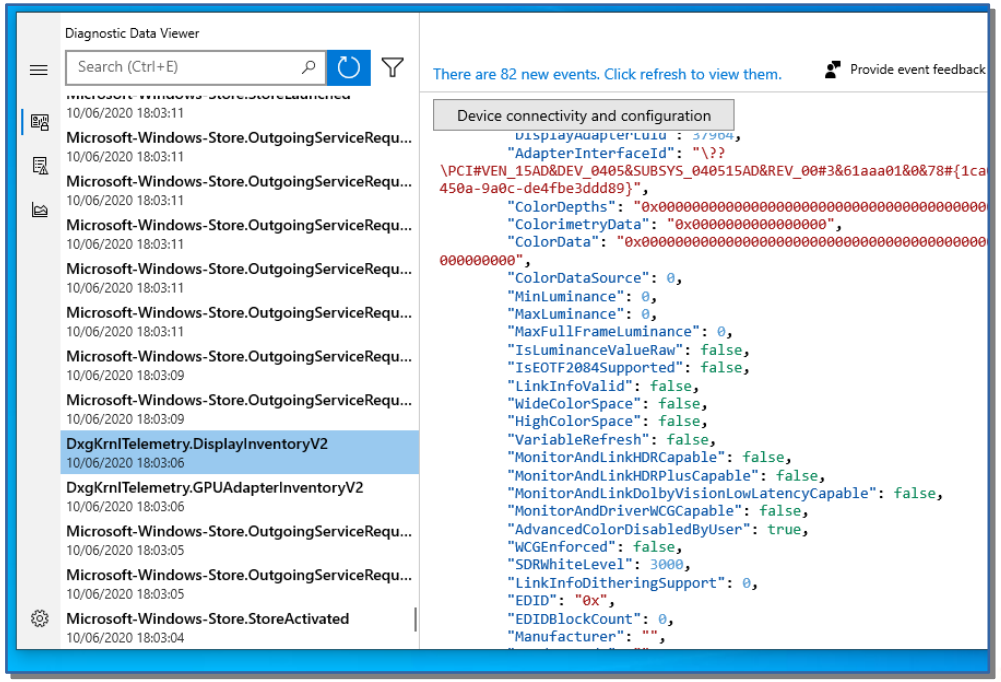
- System data uploaded by the *Connected User Experience and Telemetry* component
  - Aka Universal Telemetry Client (UTC) service, aka **Diagtrack** Service
- What is collected
  - Crash and usage data
  - Inspection of system & applications
  - System/platform information
- If “collect more information” is enabled
  - Inspection of running processes
    - Libraries loaded from DiagTrack service
  - Collection of system & platform information
    - Queries of registry & setup logs
- This may include sensitive/personal information!
  - Usage data can be used in behaviour analysis by Microsoft

Telemetry: Diagnostic Data Viewer



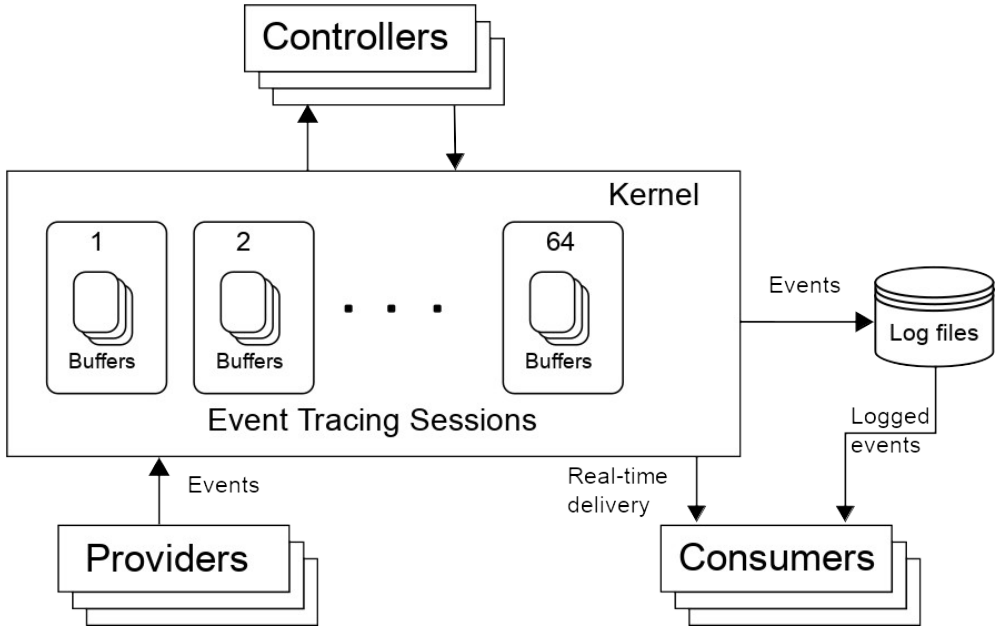
- Switch is off by default
- Requires free of charge App
- MS account required

- Diagnostic data on your system
- View only, no delete or filter



Excourse: Event Tracing for Windows

- Framework/API to build application logging
- DiagTrack & Eventlog based on it
- Controllers
  - Manage sessions
  - Create/delete
  - Activate/deactivate
  - Add/remove providers/consumers
- Providers
  - Produce (i.e. log, write logs) events
- Consumers
  - Consume (i.e. read) events
  - From log files or directly from kernel buffers (real-time)



Telemetry: Configuration (1)

- Tracking Level set in registry key:
  - `HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\DataCollection\AllowTelemetry (DWORD)`
- Configuration defines providers for given tracking level
  - Downloaded from Microsoft at regular intervals
  - `%ProgramData%\Microsoft\Diagnosis\DownloadedSettings\utc.app.json`

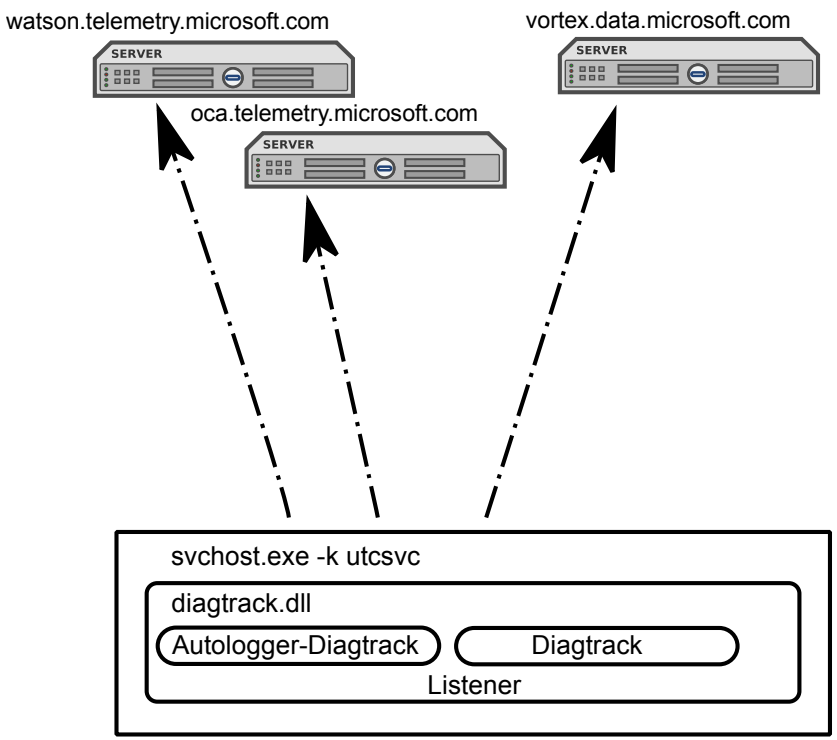
```
#{
 "queryUrl": "/settings/v3.0/utc/app",
 "settings": {
   "UTC:::ENDPOINT.TELEMETRY.ASM-WINDOWSSQ": "telemetry.0",
   "UTC:::PROVIDERDEFINITION.MICROSOFT.WINDOWS.SHELL.SYSTEMSETTINGS.SETTINGSAPPACTIVITY":
"b7afa6af-aaab-4f50-b7dc-b61d4ddbe34f",
   "UTC:::COMMONSCHEMAVERSION": "3.0",
   "UTC:::TENANT": "dedb3435bceb4d2d9f40bcb2139e6562-4de2fa0d-3dbd-4e46-a2dd-
f158b62f510a-7933",
…
```

Telemetry: Configuration (2)

Level	No of Providers for Listener		Data logged KBytes/day	Available for	Default Level
	AutoLogger-Diagtrack	Diagtrack			
0: Security	9	4		Ent, Edu	
1: Basic	93	410	~150 – 250	All	
2: Enhanced	105	418	~250 – 350	All	Ent
3: Full	112	422		All	Home, Pro

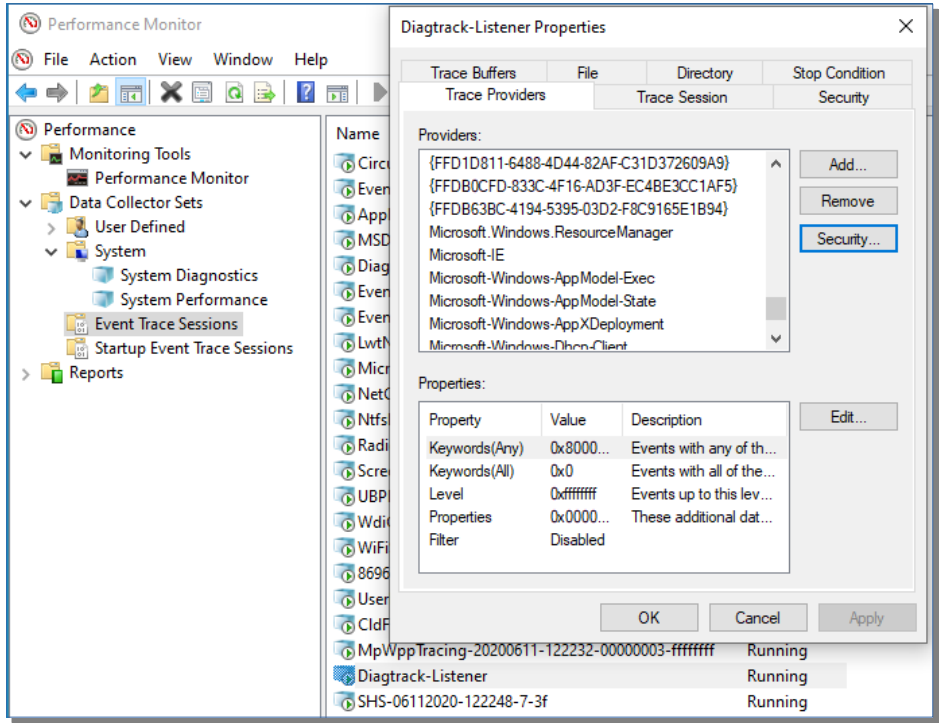
Telemetry: Transmission

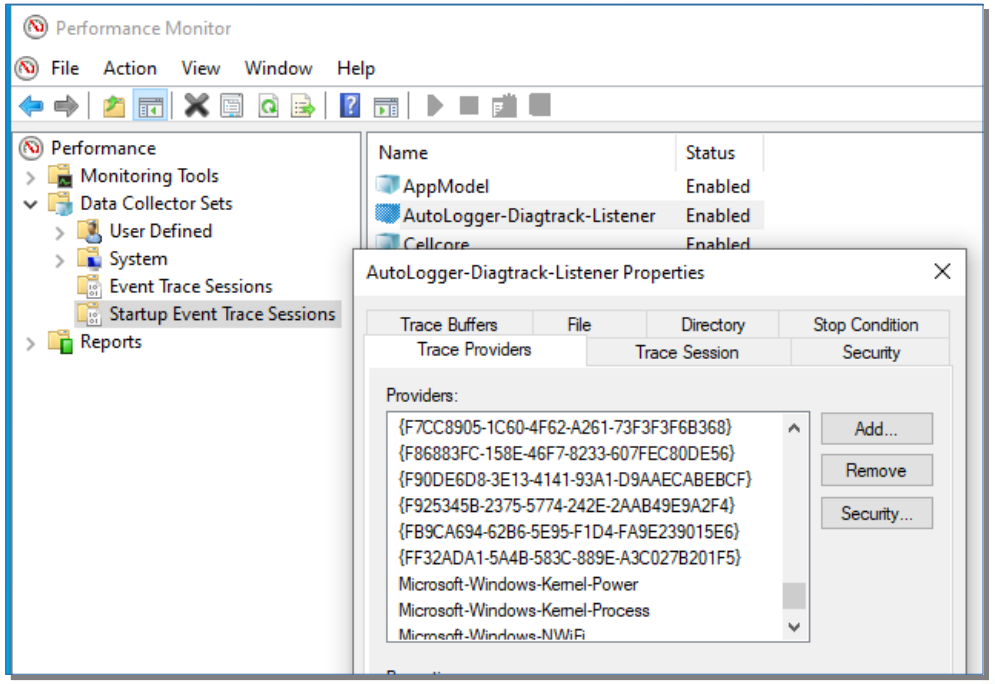
- Network: Telemetry servers
  - Names change with Windows 10 version
  - CDN, region etc. dependant
  - TLS, certificate pinned
  - Connects around every 15-20min
    - Less on metered links
- Locally: Diagtrack-Listener
  - `%ProgramData%\Windows\Diagnostic`
  - Hidden folder
- Listeners:
  - Autologger-Diagtrack for early boot events aka Startup Event Trace Sessions
  - Diagtrack for normal operation, aka Event Trace Sessions



Telemetry: perfmon.exe

- Control/inspection of telemetry sessions





Telemetry: Control (1)

- Local system:
  1. Set `AllowTelemetry` Key to `0`
  2. Deactivate `DiagTrack` Service
  3. Disallow network access to MS data collection servers (local firewall)
  4. Manipulate system name resolution for MS data collection servers (i.e. `%SystemRoot%\System32\etc\hosts`)
- Network:
  5. Disallow network access to MS data collection servers (network firewall)
  6. Manipulate DNS responses for MS data collection server names (local nameserver)

Telemetry: Control (2)

- 1) & 2) work best
  - Easy to setup through Scripts, GPOs, etc.
- 2) only solution on Pro, Home editions
- 3) – 6) problematic
  - IP addresses may change often

```
> dig  +noall +answer watson.telemetry.microsoft.com
watson.telemetry.microsoft.com. 10 IN   CNAME   umwatson.trafficmanager.net.
umwatson.trafficmanager.net.    10 IN       A   51.143.111.7
```

  - DNS names may change with Feature Upgrades
  - MS might opt to ignore etc/hosts in the future
  - Firewalls rules may not allow DNS names
  - Scripts & cronjobs for workarounds

Summary

- Telemetry/Data collection cannot be turned off completely
  - From an organisation/global security perspective, this is not entirely bad
- Trade-off between
  - Local security needs
  - Users‘ privacy
  - Users‘ convenience
  - Support from Microsoft/local admins
  - Legal: GDPR, other local laws, contracts (maintenance, warranties), etc.
- There are no patent solutions
- Only scratching the surface
  - See the links

Thank you

Any questions?

Next module: ***Logging and Audit***, 5th of August 2020

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The research leading to these results has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 731122 (GN4-2).

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