



# A Tale of Two Autopilots

Michael Niehaus  
Programme Director, Master Inventor  
2Pint Software



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# About “Michael Niehaus”

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## Focus

Developing device management and deployment solutions

## From

Sammamish, Washington, USA

## My Blog

<https://oofhours.com>

## Certifications

Many

## Hobbies

Soccer, Running

## Contact

[@mniehaus](#)

[Michael@oofhours.com](mailto:Michael@oofhours.com)

[michaeln@2pintsoftware.com](mailto:michaeln@2pintsoftware.com)



# Agenda

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## Key takeaways:

- Two distinct “flavors” of Autopilot
- Differences in capabilities and state of completion

- A tale of two versions
- Side by side walkthrough
- Peeking into the low-level traffic
- Summary
- Q&A



# Autopilot <sub>(v1)</sub> in a nutshell

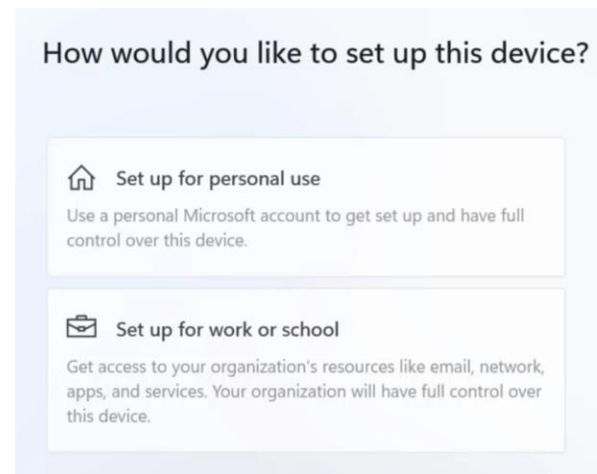
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- Simplifies the Windows out-of-box experience (OOBE)
  - Hides the complexity (that Microsoft added)
  - Organizations can configure settings via MDM policies instead of making the user choose
- Adds scenarios
  - Admin vs. non-admin
  - User-driven vs. self-deploying vs. pre-provisioning
  - Entra ID Join vs. AD Join (Hybrid AADJ)
  - Blocking access until the device is ready for productive use
- Requires device registration using a hardware hash
  - Unless using Autopilot for existing devices\*



# Do you have to use Autopilot (v1)?

- Without Autopilot, you can:
  - User-driven Entra AD Join during OOB
  - Enrolls as a personal device, unless you register the device with a corporate identifier
  - Control admin vs. non-admin via Entra ID tenant settings (but not granular)
  - Shows all OOB pages; user needs to choose
  - You can still use the Enrollment Status Page



## Local administrator settings

Global administrator role is added as local administrator on the device during Microsoft Entra join (Preview) ⓘ

☒ Yes ☐ No

Registering user is added as local administrator on the device during Microsoft Entra join (Preview) ⓘ

☒ All ☐ Selected ☐ None

Selected

No member selected



# Autopilot summarized

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- 2017
  - Introduced with Windows 10 1703 (in response to IBM's Mac@IBM program)
  - User-driven Azure AD Join
- 2018
  - Features added: Enrollment status page, Hybrid Azure AD Join, Self-deploying Mode, Windows Autopilot for existing devices
- 2019
  - Features added: White glove/Pre-provisioning
- 2020-2023:
  - Not much...
- 2024:
  - Autopilot device preparation, a.k.a. Autopilot v2, introduced with Windows 11 24H2 (also supported with Windows 11 22H2/23H2 patched to April 2024 CU)



# What's this new thing?

## ⓘ Note

This article is for Windows Autopilot device preparation. For Windows Autopilot, see [Overview of Windows Autopilot](#).

- Autopilot device preparation (v2), exists independently of the “original” Autopilot (v1)
  - References to Autopilot v1 vs. Autopilot v2 then are to preserve sanity
  - Co-existence for now
  - Possible “backporting” of v2 enhancements to v1
- Autopilot v2 is clearly still a work-in-progress (but considered “generally available,” not “preview”)
  - No device registration, but maybe still device registration?
  - Missing features to be delivered later:
    - Customize OOBЕ and rename devices during provisioning based on organizational structure.
    - Self-deploying and pre-provisioning mode.
    - Additional admin-specified configurations delivered before allowing desktop access.
    - The ability to associate a device with a tenant.
  - Corporate device identifier support to be added later (hence you must enable personal device enrollment to use v2)
- Autopilot v2 leaves some features behind
  - Hybrid Azure AD Join





# Side by side: Initial startup

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- APv1:

- APv2:

Hyper-V™

Hyper-V™



# Initial startup

- APv1:
  - Autopilot profile is downloaded when network is connected
  - Could skip language, keyboard layout if using a wired connection
- APv2:
  - Tries to download an Autopilot profile, but the response will indicate “not an Autopilot device”
  - No opportunity (yet?) to disable language, keyboard; no way (yet) to set computer name

```
{
  "AutopilotServiceCorrelationId": "4b4e9357-4af0-4dfe-9e32-40465befa470",
  "ZtdRegistrationId": "e24fc538-3d73-499c-a97f-de4031efbb5a",
  "AadDeviceId": "859fe839-df2c-4650-864d-0c67b54a6f41",
  "CloudAssignedOobeConfig": 1310,
  "CloudAssignedDomainJoinMethod": 0,
  "CloudAssignedForcedEnrollment": 1,
  "CloudAssignedTenantDomain": "contosomn.onmicrosoft.com",
  "CloudAssignedTenantId": "e65be8ec-9c6f-4a99-af78-6f170252d48c",
  "CloudAssignedMdmId": "9cb77803-d937-493e-9a3b-4b49de3f5a74",
  "CloudAssignedRegion": "US",
  "CloudAssignedLanguage": "en-US",
  "CloudAssignedDeviceName": "AAD-%RAND:8%",
  "DeploymentProfileName": "User Driven AAD",
  "IsExplicitProfileAssignment": true,
  "CloudAssignedAutopilotUpdateDisabled": 1,
  "CloudAssignedPrivacyDiagnostics": 0,
  "HybridJoinSkipDCConnectivityCheck": 0,
  "CloudAssignedAutopilotUpdateTimeout": 1800000,
  "PolicyDownloadDate": "2024-06-24T19:38:29Z",
  "PolicyDownloadCorrelationVector": "4b4e9357-4af0-4dfe-9e32-40465befa470"
}
```

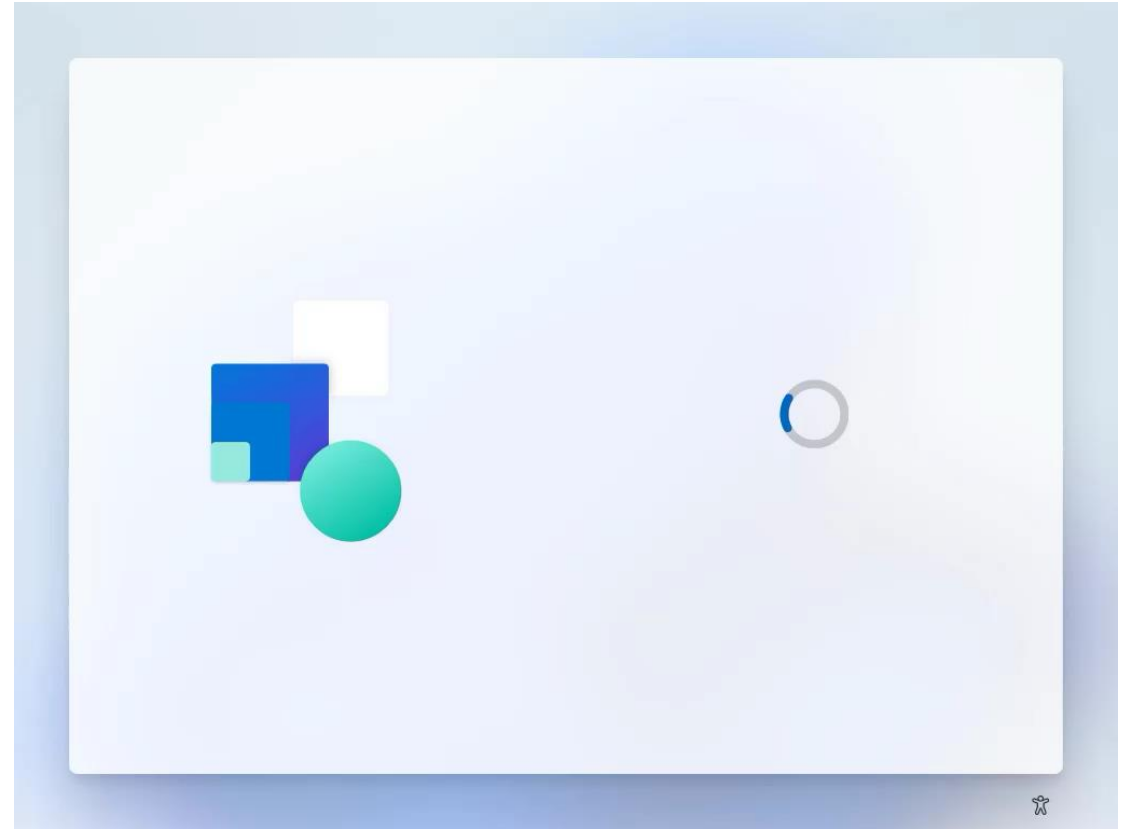
```
{
  "ErrorCode": 807,
  "ErrorReason": "ZtdDeviceIsNotRegistered",
  "PolicyDownloadDate": "2024-06-24T21:20:22Z",
  "PolicyDownloadCorrelationVector": "b0cd0f68-164e-4db4-afed-e0f322abaac5"
}
```



# Side by side: Pre-logon

- APv1:

- APv2:





# Pre-logon

---

- APv1:
  - Critical update reboot (maybe)
- APv2:
  - Critical update reboot (maybe)
  - Accept EULA
  - Type in computer name
  - Choose personal vs. work/school
  - Prompts could (?) go away with a future APv2 update




# Side by side: Logon

- APv1:

Let's set things up for your work or school

You'll use this info to sign in to your devices.

 **CONTOSO**

**Sign in**

[Use your face, fingerprint, PIN, or security key instead ?](#)

Choosing **Next** means that you agree to the [Microsoft Services Agreement](#) and [privacy and cookies statement](#).

Please respect all the policies of Contoso MN. For assistance, please contact +1 (425) 882-8080. Thank you.


**Next**

This screenshot shows the APv1 logon interface. It features a laptop icon with a green checkmark on the left. The text is centered and uses a clean, sans-serif font. The 'Next' button is a solid blue rectangle at the bottom right.

- APv2:

Let's set things up for your work or school

You'll use this info to sign in to your devices.

 **Microsoft**

**Sign in**

[Sign-in options](#)

Choosing **Next** means that you agree to the [Microsoft Services Agreement](#) and [privacy and cookies statement](#).

**Next**

This screenshot shows the APv2 logon interface. It features a clipboard and pie chart icon on the left. The text is centered and uses a clean, sans-serif font. The 'Next' button is a solid blue rectangle at the bottom right. A back arrow is visible in the top left corner.



# Logo

- APv1:
  - Branded

```
<characteristic type="DMClient">
  <characteristic type="Provider">
    <characteristic type="MS DM Server">
      <parm name="EntDeviceName" value="Michael_Windows_2/9/2021_4:44 PM" datatype="string" />
      <parm name="AADResourceID" value="https://manage.microsoft.com/" datatype="string" />
    </characteristic type="Poll">
      <parm name="NumberOfFirstRetries" value="5" datatype="integer" />
      <parm name="IntervalForFirstSetOfRetries" value="3" datatype="integer" />
    </characteristic type="Poll">

```

```
<characteristic type="FirstSyncStatus">
  <parm name="ExpectedPolicies" value="./Vendor/MSFT/Policy/Config" datatype="string" />
  <parm name="TimeOutUntilSyncFailure" value="60" datatype="integer" />
  <parm name="BlockInStatusPage" value="7" datatype="integer" />
  <parm name="SkipDeviceStatusPage" value="false" datatype="boolean" />
  <parm name="SkipUserStatusPage" value="false" datatype="boolean" />
  <parm name="AllowCollectLogsButton" value="true" datatype="boolean" />
  <parm name="CustomErrorText" value="Uh oh!" datatype="string" />
</characteristic>
</characteristic>
</characteristic>
</characteristic>
<characteristic type="EnrollmentStatusTracking">
  <characteristic type="DevicePreparation">
    <characteristic type="PolicyProviders">
      <characteristic type="Sidecar">
        <parm name="InstallationState" value="1" datatype="integer" />
      </characteristic>
    </characteristic type="PolicyProviders">

```

```
<characteristic type="PINComplexity">
  <parm name="MinimumPINLength" value="4" datatype="integer" />
  <parm name="MaximumPINLength" value="127" datatype="integer" />
  <parm name="UppercaseLetters" value="2" datatype="integer" />
  <parm name="LowercaseLetters" value="2" datatype="integer" />
  <parm name="SpecialCharacters" value="2" datatype="integer" />
  <parm name="History" value="0" datatype="integer" />
  <parm name="Expiration" value="0" datatype="integer" />
</characteristic>
<characteristic type="Remote">
  <parm name="UseRemotePassport" value="1" datatype="boolean" />
</characteristic>

```

- A

```
"policyId": "05251a8a-7837-4516-81c6-64056086f266",
"settings": {
  "timeoutInMilliseconds": 3600000,
  "maxRetryAttempts": 10,
  "completionDelayInMilliseconds": 500
},
"providers": [
  {
    "providerId": "97983a85-6d7a-4938-9135-c866779d3f58",
    "providerFriendlyName": "Standard User Provider"
  },
  {
    "providerId": "1c31c6a6-1516-41df-8657-5351809c23a7",
    "providerFriendlyName": "SLDM Provider"
  },
  {
    "providerId": "69840f3c-71a1-4968-8986-ef5cf2abc881",
    "providerFriendlyName": "PowerShell Scripts Provider"
  },
  {
    "providerId": "36263157-87a7-4273-9ebd-56fd7862aebd",
    "providerFriendlyName": "Win32Apps Provider"
  }
],
"batchList": [
  {
    "batchFriendlyName": "Batch 0",
    "batchNumber": 0,
    "actionsList": [
      {
        "actionId": "f3a9c8a2-7d6b-4a5e-9c1d-8e2f1b0d3a4c",
        "actionFriendlyName": "Standard User Provisioning",
        "batchNumber": 0,
        "providerId": "97983a85-6d7a-4938-9135-c866779d3f58",
        "providerContextId": "d7b3f8a1-2a4c-4f9d-8b6a-1a0c5d2f7b2e",
        "providerContext": "\\{\\userSid\\;\\S-1-12-1-4279119295-1250845936-977460655-434848461\\;\\\"providerId\\\":\\\"97983a85-6d7a-4938-9135-c866779d3f58\\\"}"
      }
    ]
  },
  {
    "batchFriendlyName": "Batch 1",
    "batchNumber": 1,
    "actionsList": [
      {
        "actionId": "c54bea24-c109-42ce-9389-93832bfb0ea2",
        "actionFriendlyName": "Device Prep Profile-Limited SLDM Provisioning",
        "batchNumber": 1,
        "providerId": "1c31c6a6-1516-41df-8657-5351809c23a7",
        "providerContextId": "8508f687-2886-4f04-8476-c46e42823887",
        "providerContext": "\\{\\syncSessionIntervalInMilliseconds\\;:30000,\\\"providerId\\\":\\\"1c31c6a6-1516-41df-8657-5351809c23a7\\\"}"
      }
    ]
  },
  {
    "batchFriendlyName": "Batch 2",
    "batchNumber": 2,
    "actionsList": [
      {
        "actionId": "f8118e16-5502-41ed-8ca1-51e813e6ec1",
        "actionFriendlyName": "Scripts Provisioning",
        "batchNumber": 2,
        "providerId": "69840f3c-71a1-4968-8986-ef5cf2abc881",
        "providerContextId": "8508f687-2886-4f04-8476-c46e42823887",
        "providerContext": ""
      }
    ]
  },
  {
    "batchFriendlyName": "Batch 3",
    "batchNumber": 3,
    "actionsList": [
      {
        "actionId": "8c943abd-289b-4839-8eb8-e79be1d87dfe",
        "actionFriendlyName": "Win32Apps Provisioning",
        "batchNumber": 3,
        "providerId": "36263157-87a7-4273-9ebd-56fd7862aebd",
        "providerContextId": "8508f687-2886-4f04-8476-c46e42823887",
        "providerContext": ""
      }
    ]
  }
]
}
```



# BootstrapperAgent

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- Provider model:
  - Standard User Provider
  - SLDM (stateless device management?) Provider
  - PowerShell Scripts Provider
  - Win32Apps Provider
- Not yet documented for other MDM providers to use (or for anyone to understand without reverse engineering)
- All providers implemented by Intune Management Extension
  - Can be changed at any time (updated at least monthly)
  - Not (necessarily) dependent on changes in Windows
- Progress information fed back to the OOB UI
  - So that "brain dead" progress display could be fixed at any time (more on that later)



# Logon

---

- APv1:
  - Registered devices are always considered “corporate”
  - Autopilot for existing devices: Not registered, so enabling personal enrollment is (now) necessary
  - Admin rights configured via profile (later in the process) based on APv1 profile
- APv2:
  - Devices will enroll as personal
    - Register devices using corporate device identifiers
    - Or, enable personal device enrollment
  - Devices will switch to “corporate” once enrolled
  - Works just fine with gov’t clouds
  - Admin rights configured via profile (later in the process) based on APv2 profile, but there is a conflict with Entra ID





# Side by side: Progress, part 1


- APv1: (3 min)

- APv2: (2 min 15 sec)

The image shows two side-by-side mobile app login screens for 'Contoso MN'. Both screens have a light blue background with a white card containing the login form. On the left is the APv1 screen, and on the right is the APv2 screen. The screens are identical in content, with the only difference being a mouse cursor icon located near the bottom right of the APv2 screen.

Let's set things up for your work or school

You'll use this info to sign in to your devices.

 CONTOSO

← michael@contosomn.com

Enter password

Password

[Forgot my password](#)

Please respect all the policies of Contoso MN. For assistance, please contact +1 (425) 882-8080. Thank you.

Sign in



# Progress, part 1

---

- APv1:
  - Waiting for Intune Management Extension MSI to install and calculate needed apps
  - MSIs and Office install during this time too
- APv2:
  - Waiting for Intune Management Extension MSI to install and calculate needed apps, scripts
    - Faster due to "enrollment time grouping" that allows for pre-calculation of policies
  - MSIs and Office install in this phase too



# Side by side: Progress, part 2

- APv1: (~20 min)

- APv2: (~25 min)

The image displays two side-by-side screenshots of a Windows 'Setting up for work or school' window, comparing the progress of two different setup versions.

**Left Screenshot (APv1):**

- Title:** Setting up for work or school
- Message:** This will take a few minutes. Your device might need to restart as we complete the setup.
- Device preparation:** Indicated as 'Completed' with a green checkmark icon. Below this, four steps are listed as completed: 'Securing your hardware (Completed)', 'Joining your organization's network (Completed)', 'Registering your device for mobile management (Completed)', and 'Preparing your device for mobile management (Completed)'.
- Device setup:** Indicated as 'Working on it...' with a progress bar showing approximately 75% completion (4 out of 5 dots filled).

**Right Screenshot (APv2):**

- Title:** Setting up for work or school
- Message:** This will take a few minutes. Your device might need to restart as we complete the setup.
- Progress:** A circular progress indicator shows '3% completed'.
- Status:** The text 'Installing management extension...' is displayed below the progress circle.



# Progress, part 2

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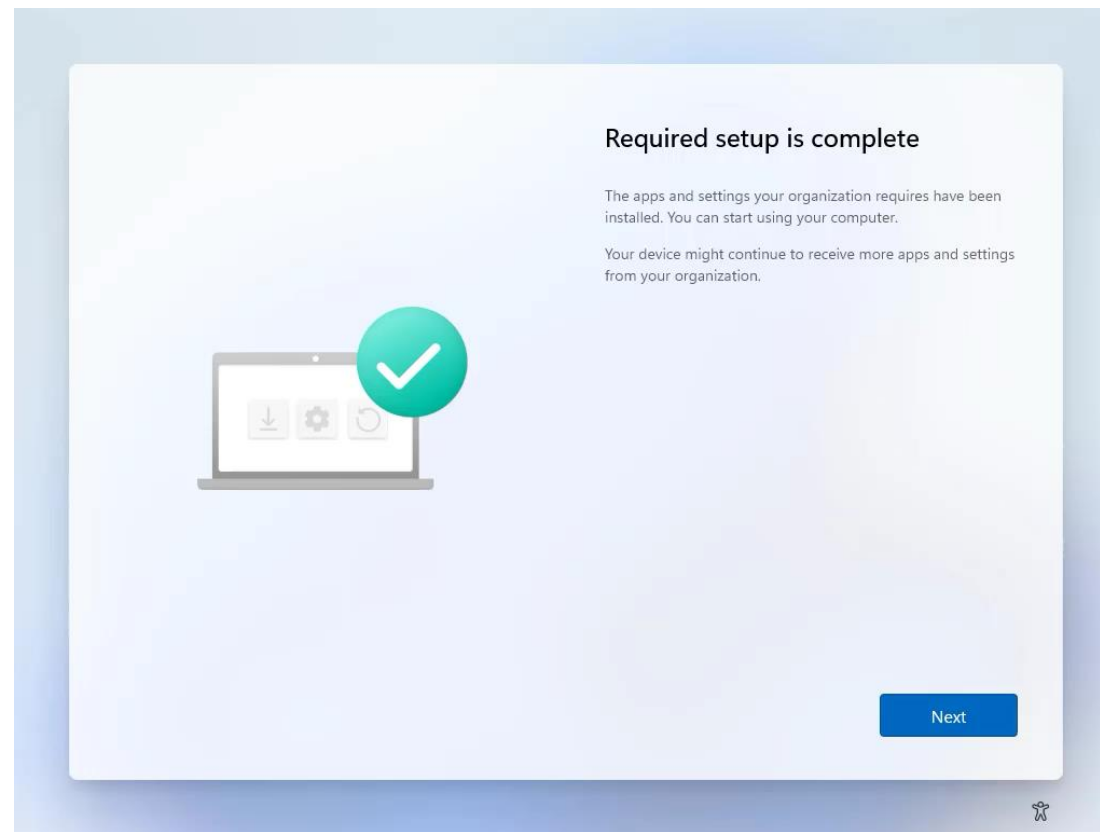
- APv1:
  - Tracking the installation of Win32 apps (mostly)
    - Up to 100 apps (not counting dependencies)
- APv2:
  - Tracking the installation of PowerShell scripts and Win32 apps
    - Up to 10 of each (not counting dependencies?)
  - Notice the “brain-dead simple” progress
    - Just indicates “time passed,” not actual progress (at this point at least)
    - [What is it with Microsoft and progress bars?](#)
  - Why does APv2 take longer?
    - Poor (re-)initialization time after an app-triggered reboot?



# Side by side: Post-completion

- APv1:

- APv2:





# Post-completion

---

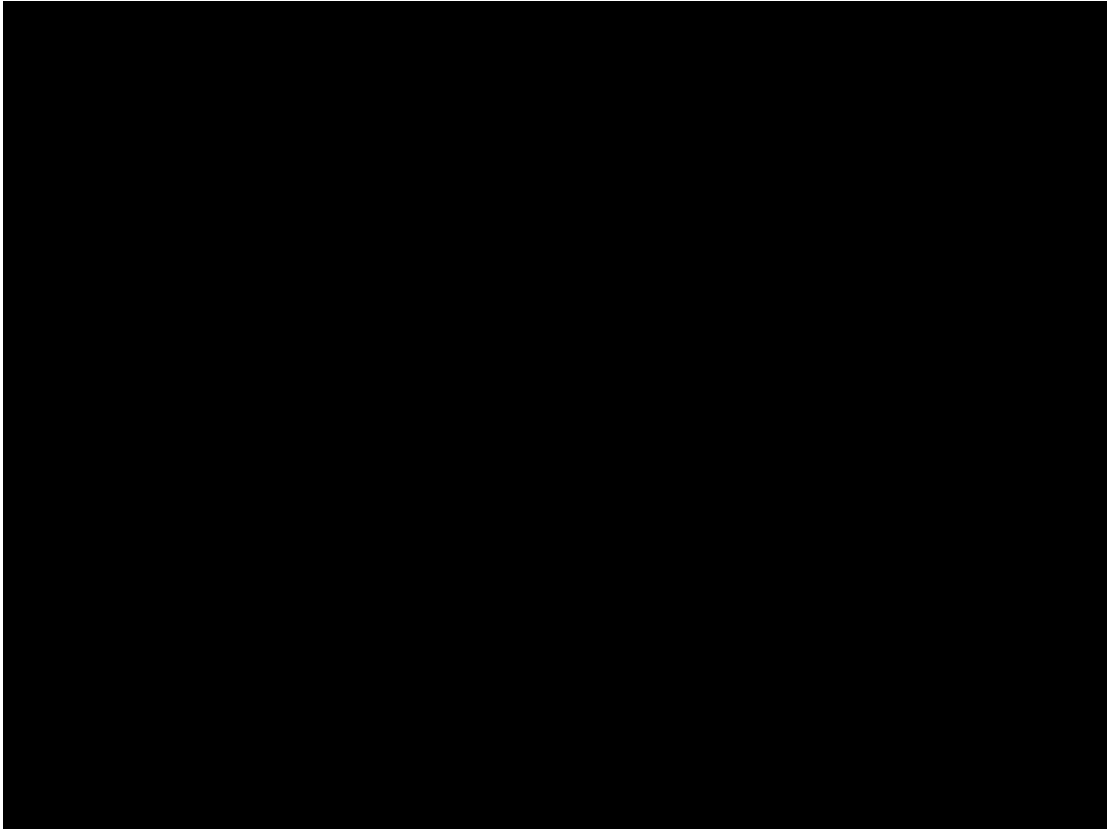
- APv1:
  - N/A
- APv2:
  - No way to suppress or time out “finished” screen (yet?)
  - User is prompted (still in OOB) to accept security/privacy defaults (for now?)
  - Interaction with MDM-delivered policies is unknown
  - Other Win32 apps, PowerShell scripts will start installing while this screen is displayed



# Side by side: User progress

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- APv1: (~2 min)



- APv2: (N/A)



# User progress

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- APv1:
  - User ESP happens after user sign-in
- APv2:
  - No user ESP available
    - Replaced with Company Portal?
  - Overall APv2 process (currently) completes while still in (machine) OOBE





# Side by side: Monitoring

- APv1:

Microsoft Intune admin center

Home > Devices > Monitor >

### Windows Autopilot deployments (preview)

Status of Autopilot deployments

Filter Refresh

Data is retained for the last 30 days

Search by Serial number, User, Device name, or AIP profile

Enrollment date	Enrollment method	Serial number	Device name	User	Autopilot profile
06/24/24, 12:39 PM	User-driven Microsoft Entra ID	4560-4266-2335-1049-2658-0309-78	D-4560-4266-233	Michael@contoso.com	User Driven AAD
06/24/24, 10:46 AM	User-driven Microsoft Entra ID	4560-4266-2335-1049-2658-0309-78	D-4560-4266-233	Michael@contoso.com	User Driven AAD
06/24/24, 9:39 AM	User-driven Microsoft Entra ID	4560-4266-2335-1049-2658-0309-78	ba7228b7-a247-41ce-a738-36d4e...	Michael@contoso.com	User Driven AAD
06/19/24, 4:54 PM	User-driven Microsoft Entra ID	4560-4266-2335-1049-2658-0309-78	D-4560-4266-233	Michael@contoso.com	User Driven AAD
06/19/24, 4:43 PM	User-driven Microsoft Entra ID	5615-6360-3644-0085-8872-8766-25	AAD-11532800	Michael@contoso.com	User Driven AAD
06/19/24, 4:15 PM	User-driven Microsoft Entra ID	4560-4266-2335-1049-2658-0309-78	AAD-68295072	Michael@contoso.com	User Driven AAD
05/21/24, 10:53 PM	User-driven Microsoft Entra ID	1511-5866-6131-7963-4996-1648-62	AAD-96080697	Michael@contoso.com	User Driven AAD
05/27/24, 12:09 PM	User-driven Microsoft Entra ID	4560-4266-2335-1049-2658-0309-78	AAD-15074014	Michael@contoso.com	User Driven AAD
05/25/24, 11:00 PM	User-driven Microsoft Entra ID	4560-4266-2335-1049-2658-0309-78	AAD-17505149	Michael@contoso.com	User Driven AAD

D-4560-4266-233 - Properties

Windows Autopilot devices

Registered date: 05/25/24, 10:31 PM

Enrollment date: 06/24/24, 12:39 PM

Enrollment method: User-driven Microsoft Entra ID

User-driven Microsoft Entra ID

Serial number: 4560-4266-2335-1049-2658-0309-78

Operating system version: 10.0.21H0.360

Device name: D-4560-4266-233

User: Michael@contoso.com

Autopilot profile: User Driven AAD

Enrollment status page profile: Default

Enrollment state: Enrolled

Enrollment status page deployment state: Success

Deployment start time: 06/24/24, 12:39 PM

Deployment end time: 06/24/24, 1:10 PM

Deployment total time: 39 mins 41 secs

- APv2:

Microsoft Intune admin center

Home > Devices > Monitor >

### Device enrollment - Autopilot deployments

Refresh Export Columns

Search Add filters

Monitor the status of your Autopilot deployments for devices that have successfully enrolled to Intune.

Device name	Enrollment date	Deployment status	Phase	Serial number	Deployment time
D-7456-2955-735	6/24/2024, 9:22:45 PM	Success	Apps installation	7456-2955-7350-7226-3713-484...	37 Minutes 30 Seconds
270eed4f-9576-4524-b827-e66c3	6/20/2024, 6:22:22 PM	Success	Apps installation	Not available	34 Minutes 21 Seconds
16581ba9-b922-4200-a123-ab3ab	6/20/2024, 5:49:24 PM	In progress	Apps installation	Not available	In progress
955debd7-6fca-4174-9f69-e8789	6/20/2024, 4:34:13 PM	Failed	Apps installation	Not available	21 Minutes 10 Seconds
aaa106df-a771-4c31-a469-16b41	6/20/2024, 5:58:21 AM	Failed	Apps installation	Not available	21 Minutes 42 Seconds
7ad43872-9614-4b51-a262-6765f	6/20/2024, 5:37:56 AM	In progress	Apps installation	Not available	In progress
67bdc67-ceae-4629-a647-73216	6/19/2024, 1:15:18 AM	Failed	Apps installation	Not available	23 Minutes 48 Seconds
a5e89508-6469-4f9b-9d15-f6b08	6/19/2024, 9:44:12 PM	Failed	Apps installation	Not available	22 Minutes 19 Seconds
d074b9c9-e017-4395-9f13-8a492	6/19/2024, 9:07:20 PM	Failed	Apps installation	Not available	30 Minutes 28 Seconds
0232660e-b9b2-4daa-8ac4-25c3c	6/19/2024, 8:49:28 PM	Success	Apps installation	Not available	10 Minutes 28 Seconds

Device deployment details

D-7456-2955-735

Device Apps Scripts

Refresh Columns

Search Add filters

Review the status of apps install on device during Windows setup.

App name	Status	Selected	App type
Company Portal	Installed	Yes	WinGetSto...
Adobe Acrobat Reader DC	Skipped	Yes	WinGetSto...
Update OS	Installed	Dependent	WindowsCL...
Microsoft 365 Apps for Windo...	Installed	Yes	OfficeSuite...
Autopilot Branding	Installed	Yes	WindowsCL...
MDT Task Sequence	Installed	Yes	WindowsCL...
OCIEE Entertain	Installed	Yes	WindowsCL...
3Print Software Shiftet Client (x...	Installed	Yes	WindowsM...



# Monitoring and troubleshooting

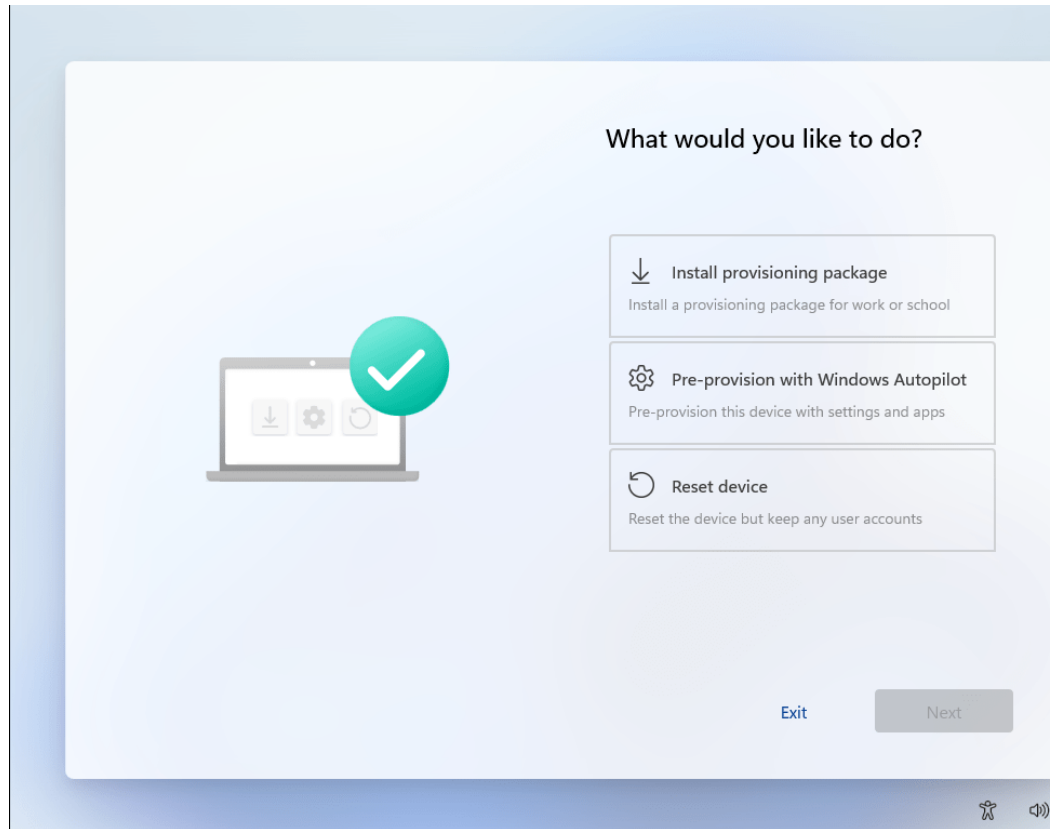
---

- APv1:
  - Still in (perpetual?) preview
  - “Less real time” = can be 10-15 minutes behind (?)
  - Local diagnostics page (Ctrl-Shift-D)
  - Get-AutopilotDiagnostics and Get-AutopilotDiagnosticsCommunity scripts for troubleshooting
- APv2:
  - Not in preview?
  - More details about apps and scripts
  - “Near real time” = can be 5-6 minutes behind
  - No local diagnostics
  - No troubleshooting scripts (yet)

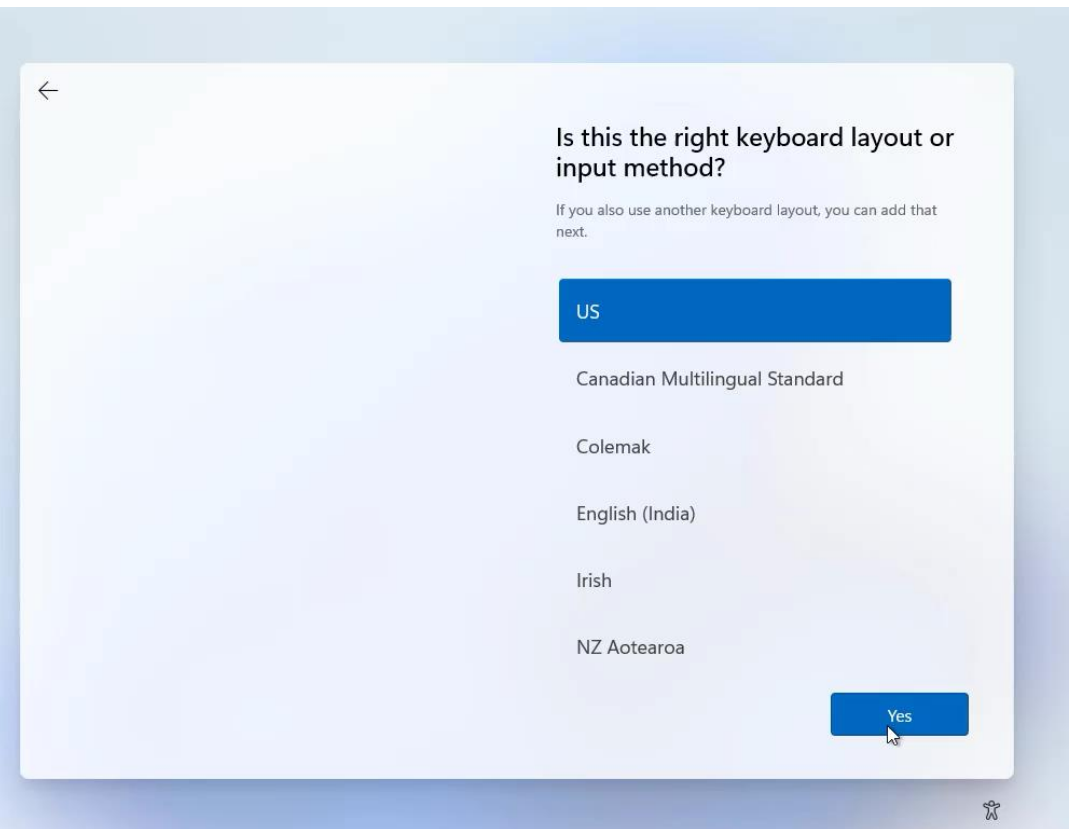


# Side by side: 5x Windows key

- APv1:



- APv2:





# 5x Windows key

---

- APv1:
  - Start Autopilot pre-provisioning (white glove)
- APv2:
  - Associate device with a tenant
  - Tag device in UEFI with the tenant ID?
  - Create corporate device ID?
  - Branded sign-in? (tenant ID hint)
  - Skip personal vs. work/school?
  - Skip EULA?
  - What can OEMs do?
    - ✓ Tag the device in UEFI with the tenant ID
    - ❑ Create corporate device ID in Intune (?)
  - Convenience feature or security feature?



# For more information

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- [Autopilot v2: My “second” thoughts](#)
  - Includes links to other Autopilot v2 posts
  - Key points:
    - Biggest change to Autopilot since its introduction
    - Still a work-in-progress
      - Scenarios missing (self-deploying, pre-provisioning), capabilities missing (computer naming, user ESP), etc.
    - Compromises have been made
      - Some temporary, some permanent
    - Logic shifts from Windows into Intune Management Extension
      - Should enable a greater pace of change – IME is updated at least monthly



# Changes in Autopilot v2 since introduction

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- Bug fixes



**Thank You**

