ALSID

ANSSI

SATURDAY, 29TH JULY 2017

WSUSpendu

USE WSUS TO HANG ITS CLIENTS

YVES LE PROVOST & ROMAIN COLTEL

Who we are, what we do...

- Yves Le Provost
  - Security auditor for more than 10 years
  - Currently works for French cyber defense Agency (ANSSI)
  - Specializes in SCADA and database assessments, but masters any other field ;-)

- Romain Coltel
  - Former security auditor
  - Currently works for a disruptive startup
  - Developing next-gen Active Directory security product

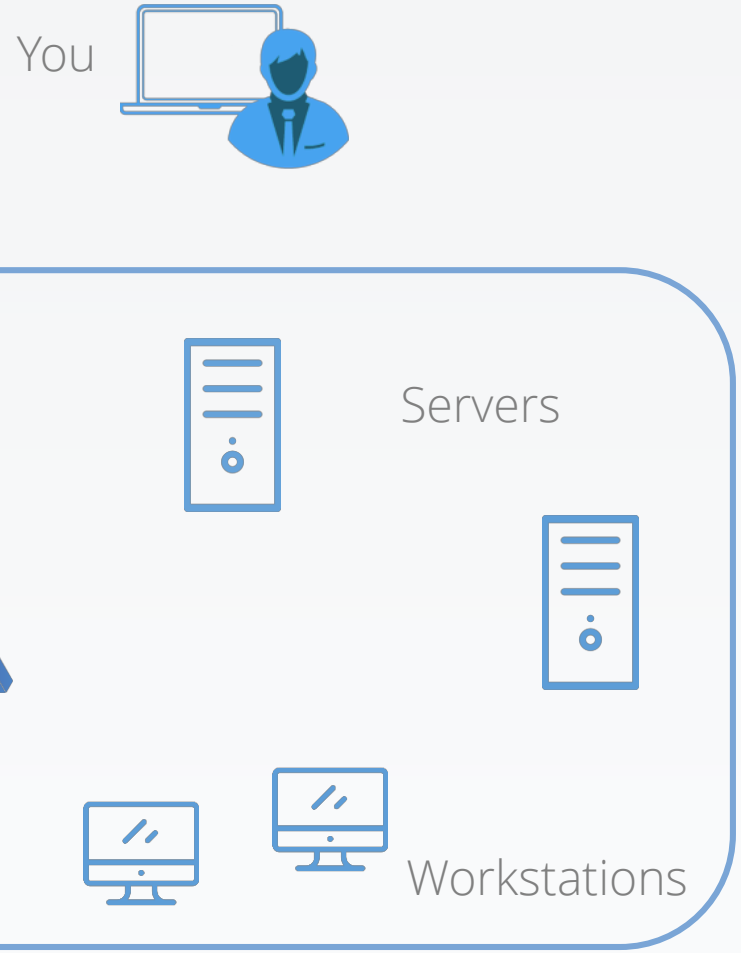
The problem

Sometimes, compromising a network is not that easy.

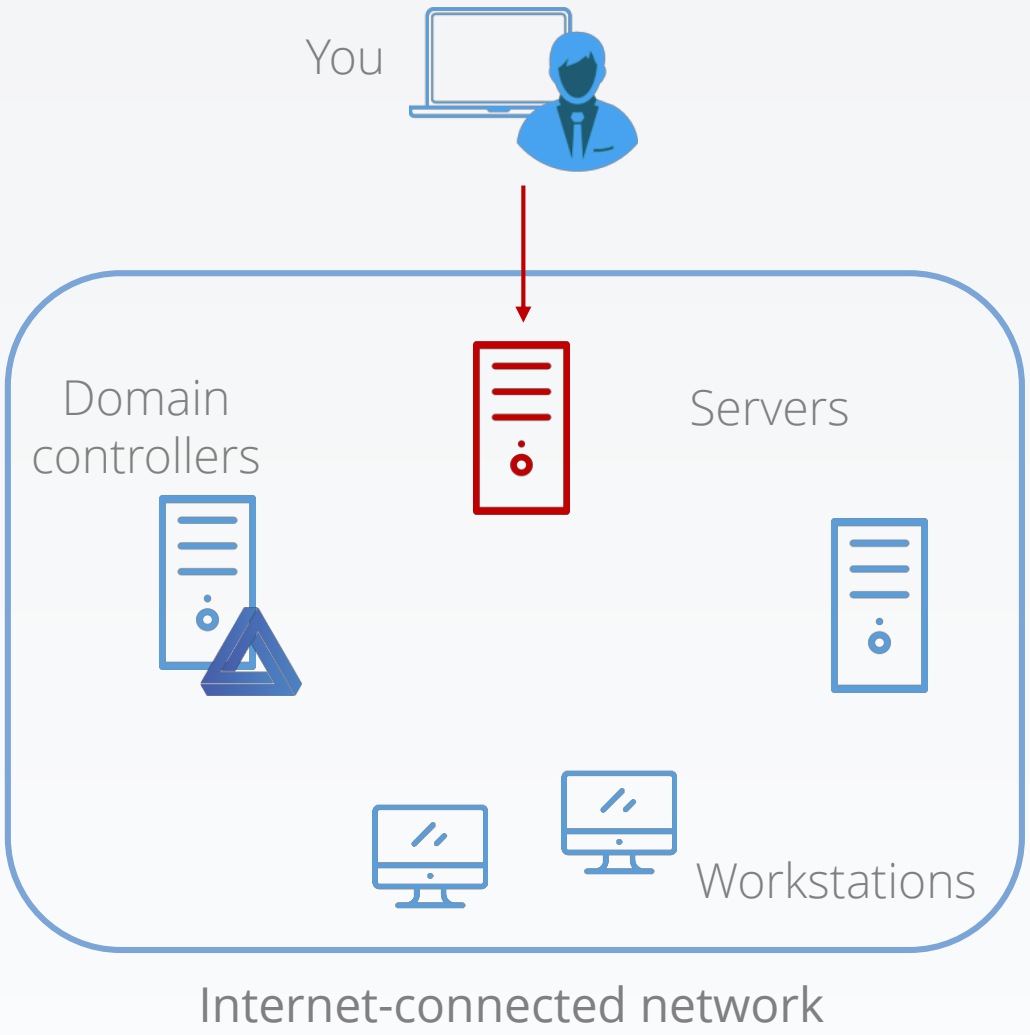
Compromise scenario

You 

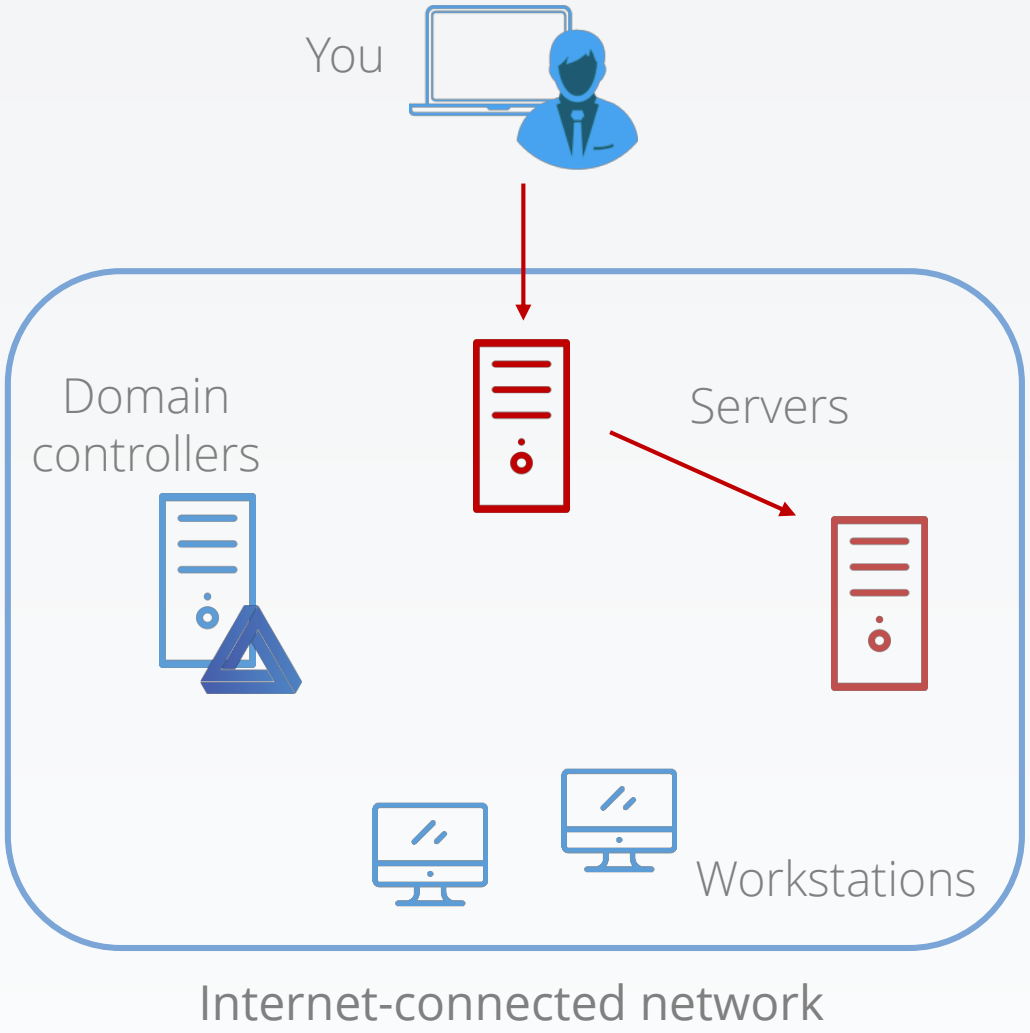
Compromise scenario



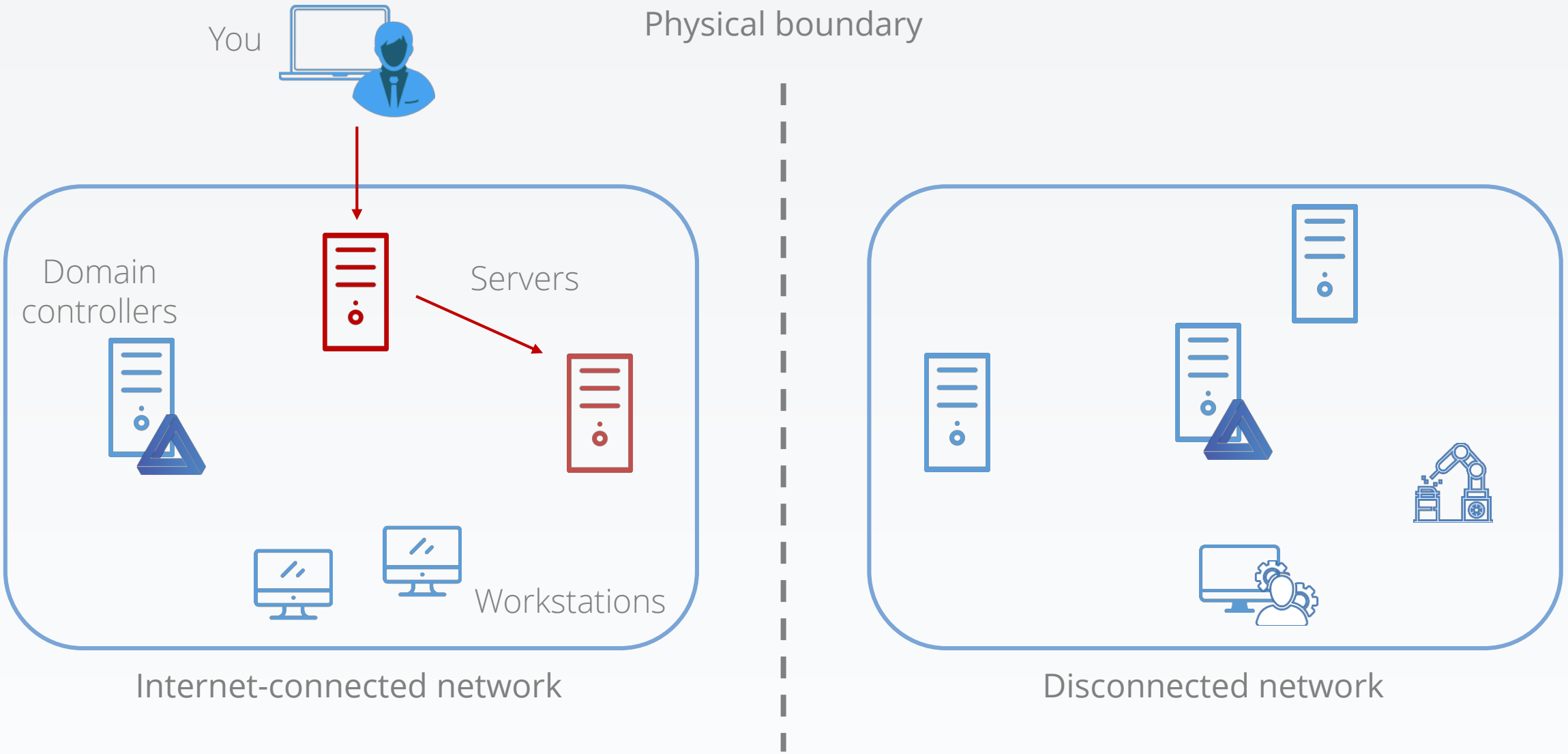
Compromise scenario



Compromise scenario



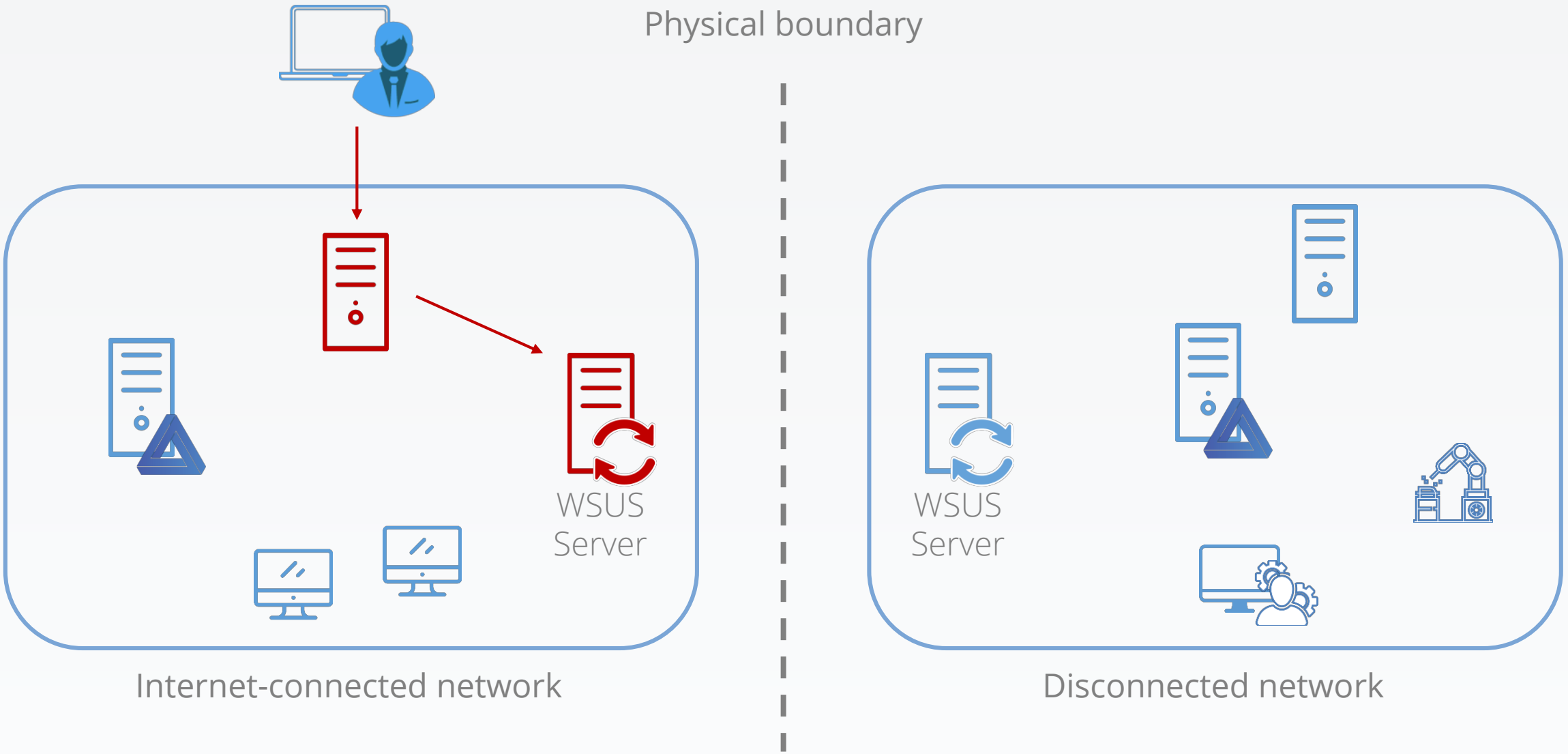
Compromise scenario



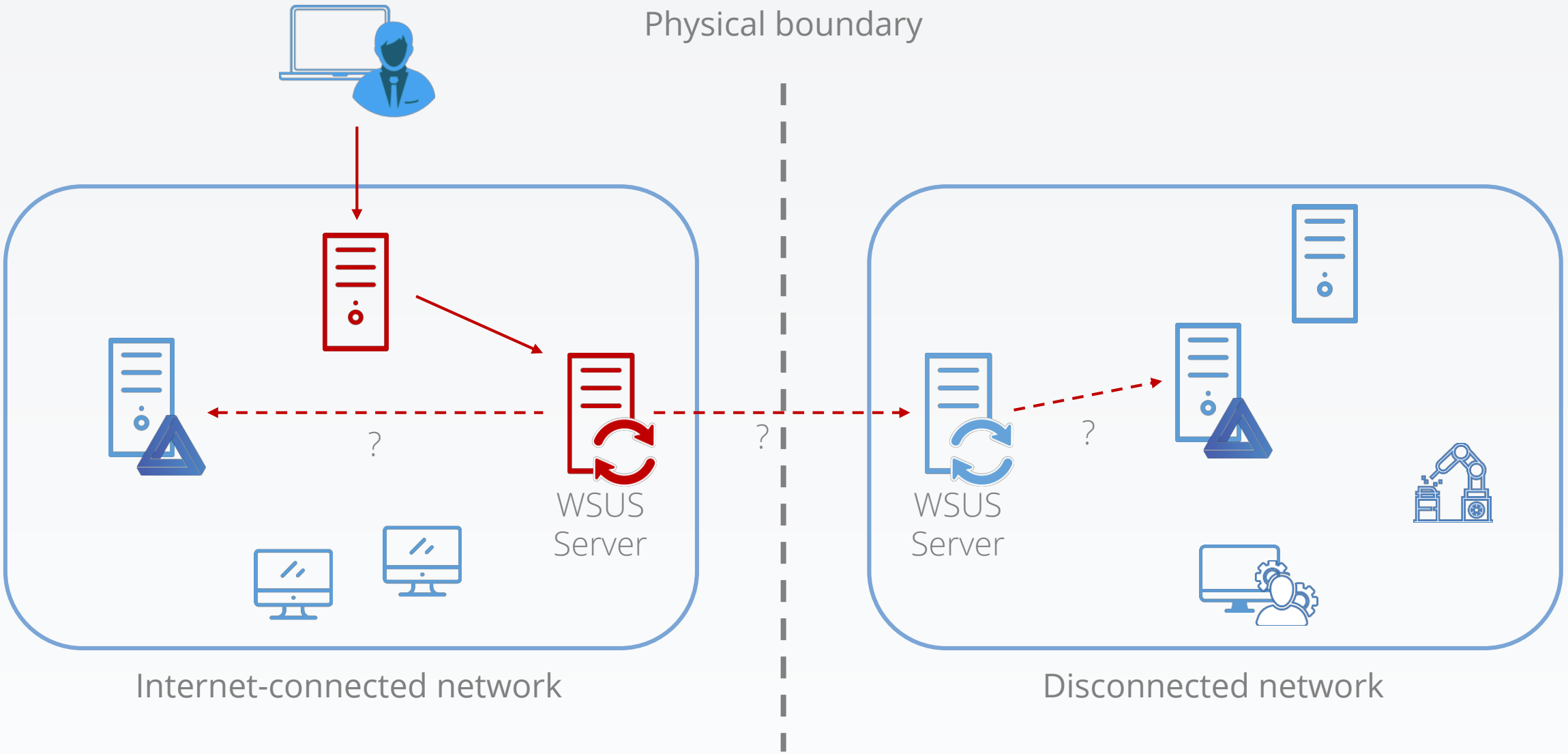
The solution?

Sometimes, compromising a network might not be as far as we think.

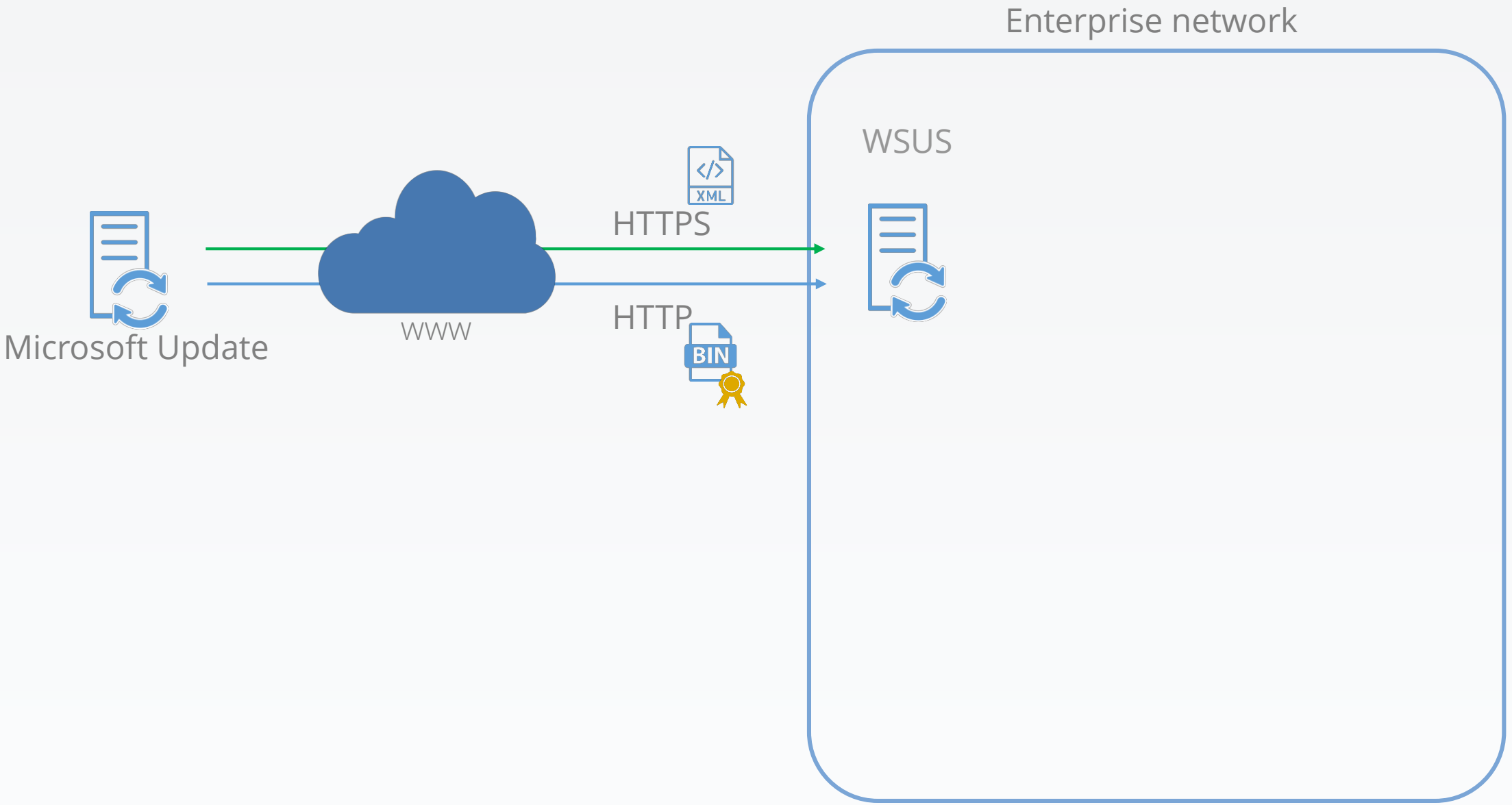
Potential compromise scenario



Potential compromise scenario



Windows Server Update Services (WSUS)



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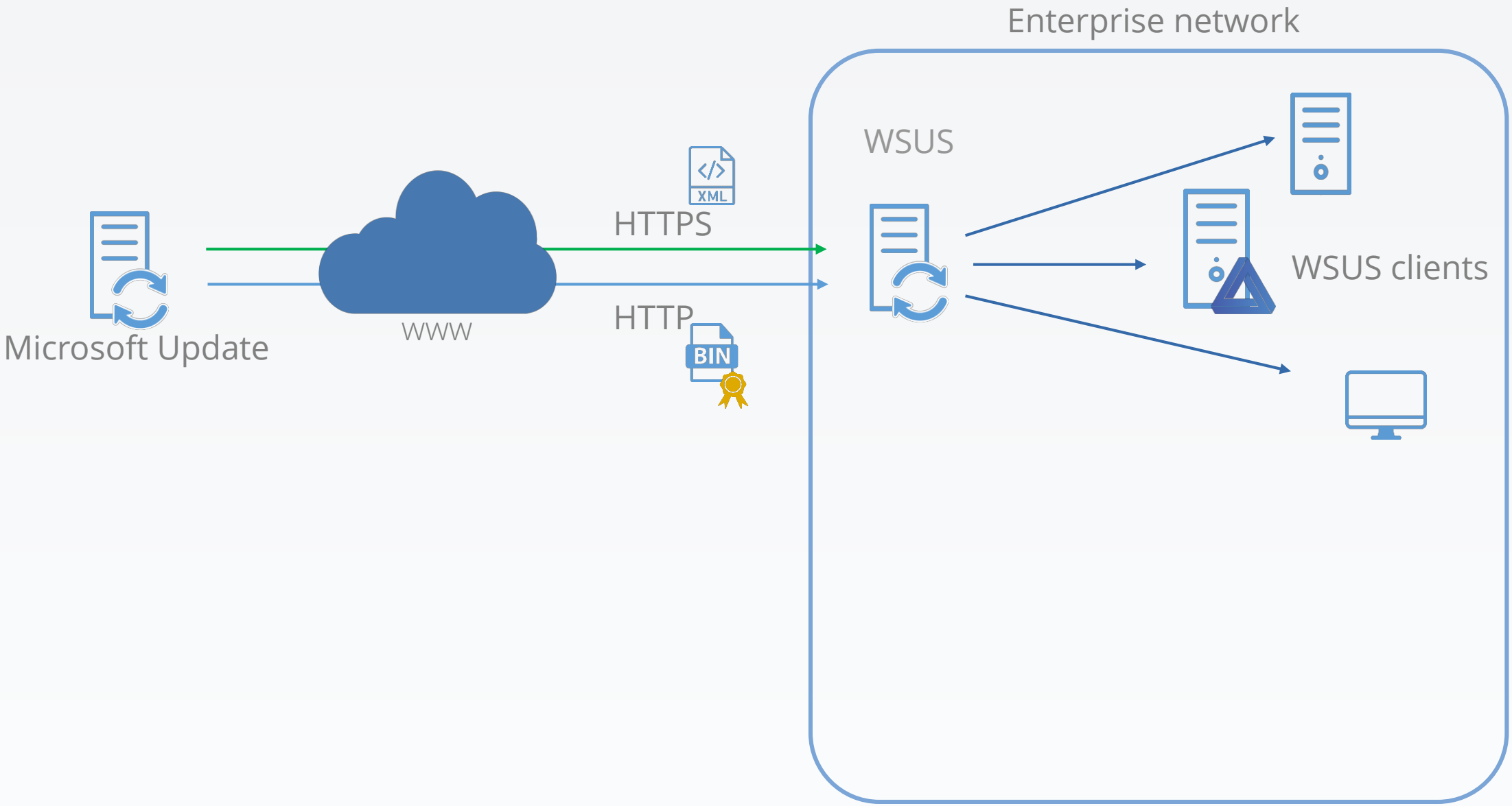

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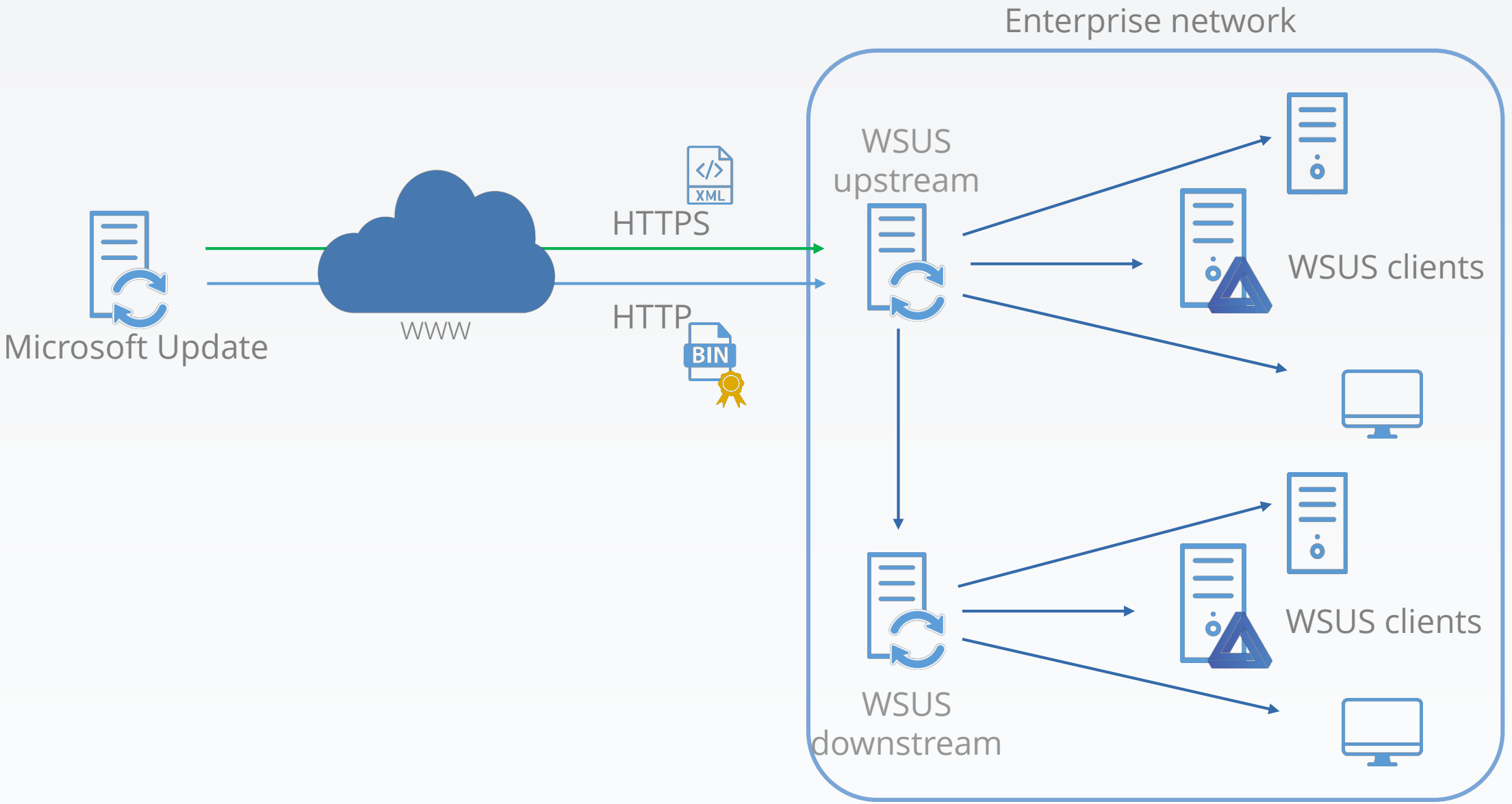

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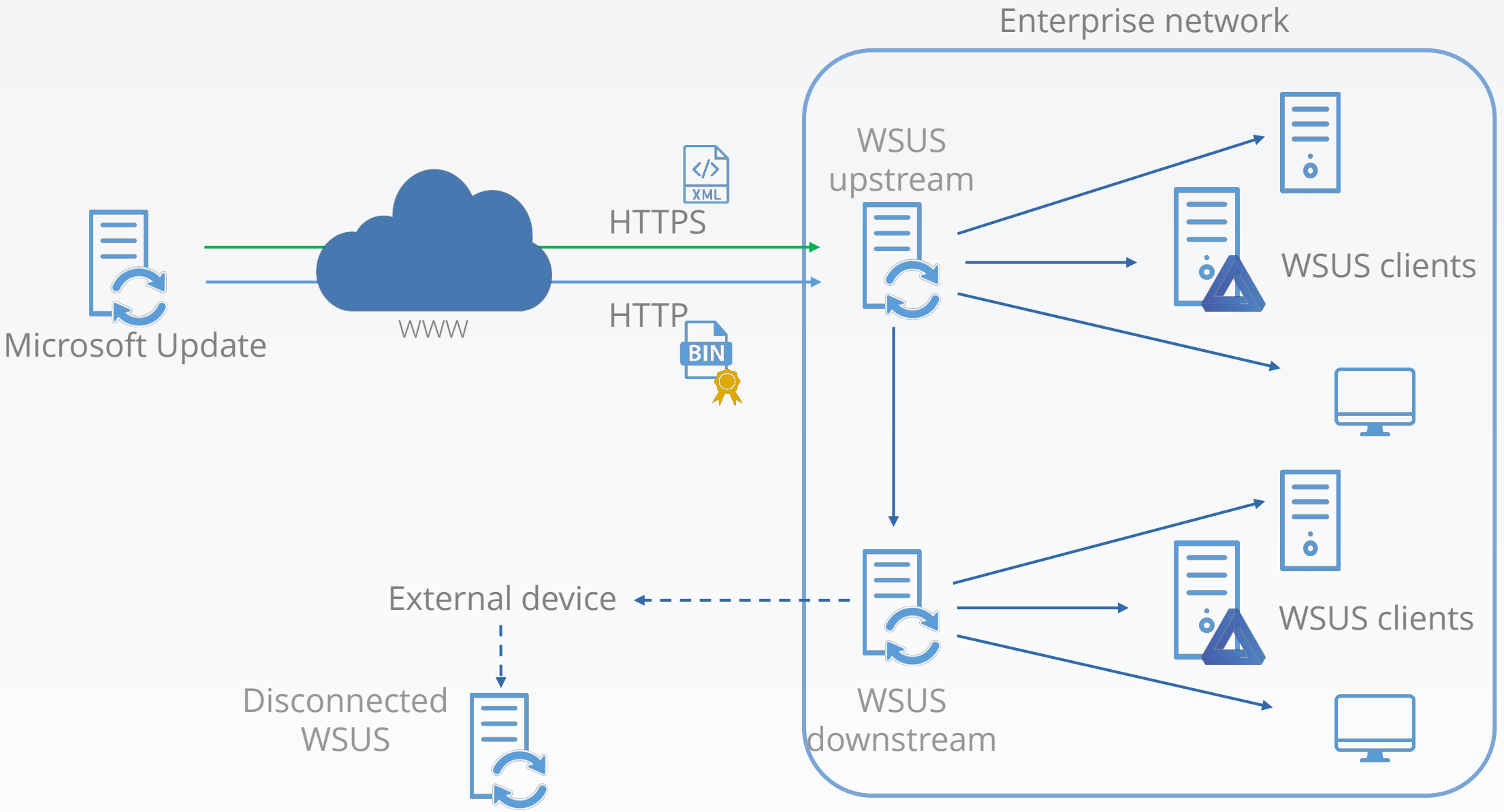
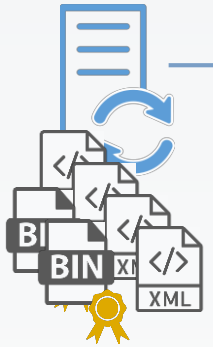


Updates journey within a WSUS server

Microsoft Update



Windows service

Web service

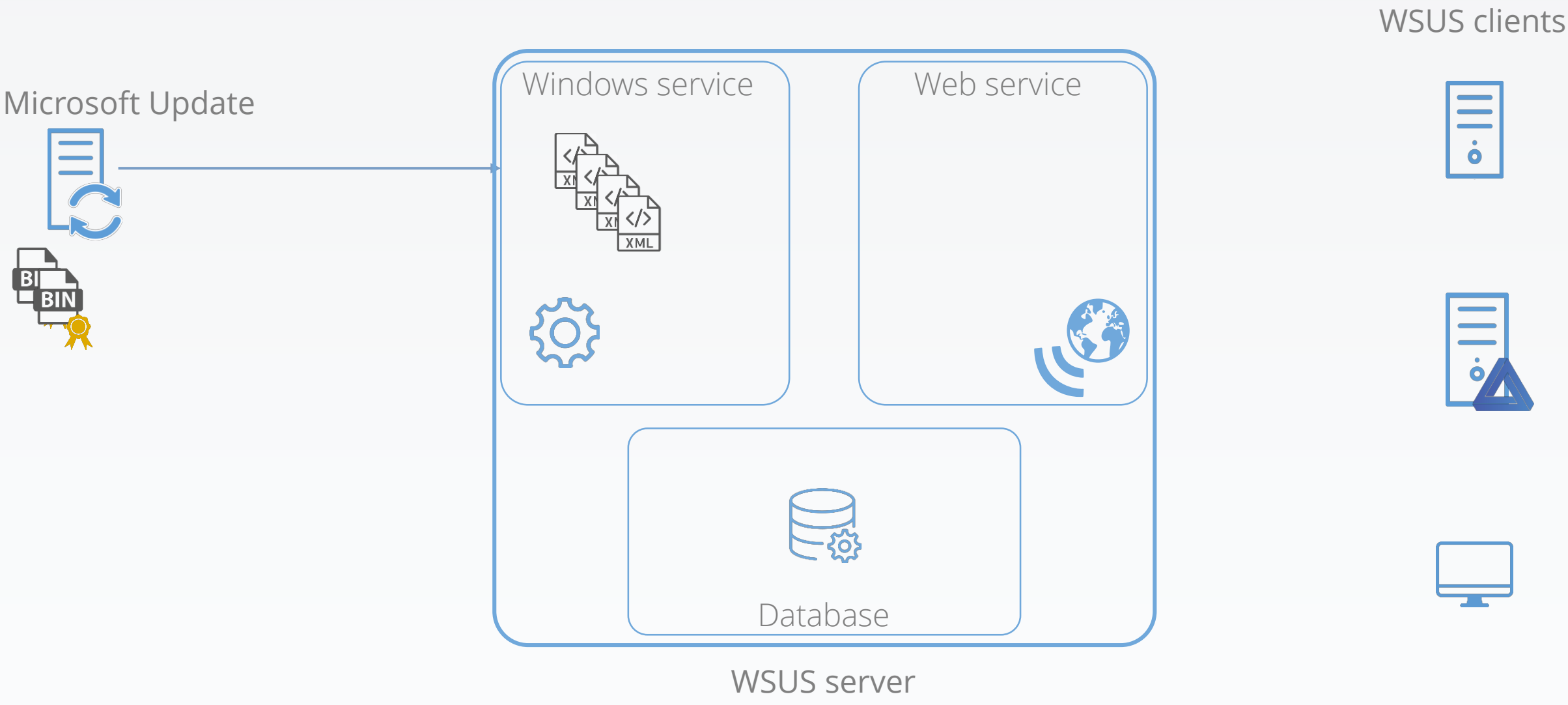
Database

WSUS server

WSUS clients

Updates journey within a WSUS server

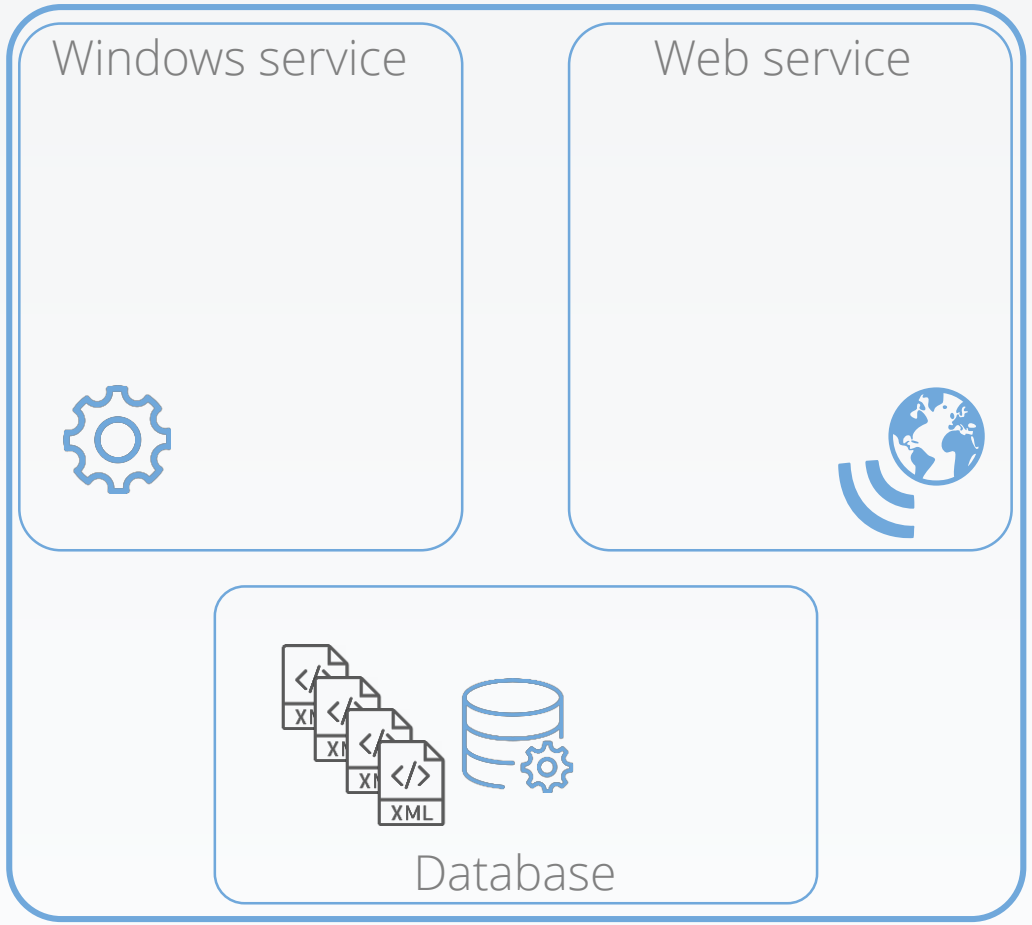
1. Windows service downloads update metadata (binaries size, download URL, command-line arguments, ...)



Updates journey within a WSUS server

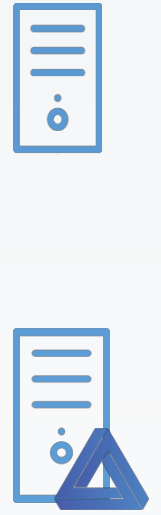
2. Windows service transmits the metadata to the database

Microsoft Update



WSUS server

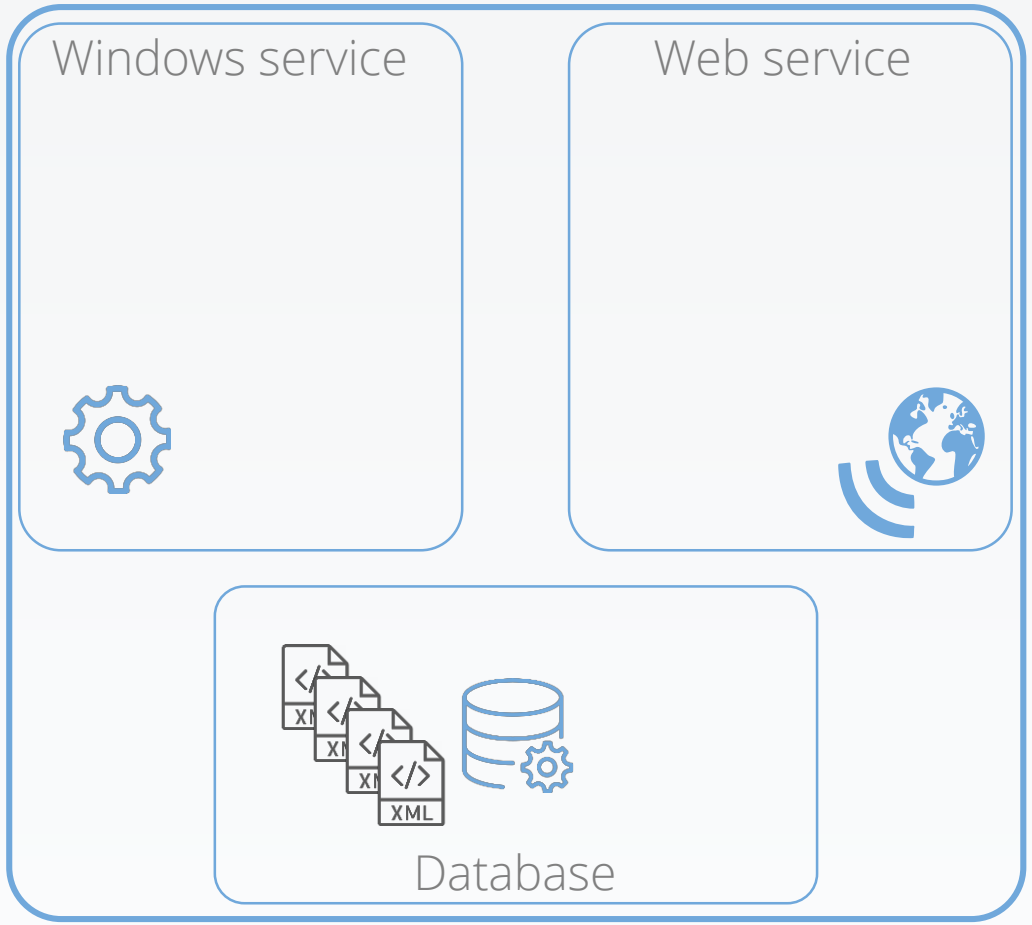
WSUS clients



Updates journey within a WSUS server

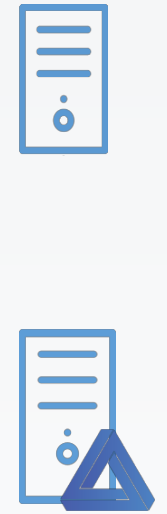
3. The database uses functions to parse metadata inputs, incorporates them into its tables

Microsoft Update



WSUS server

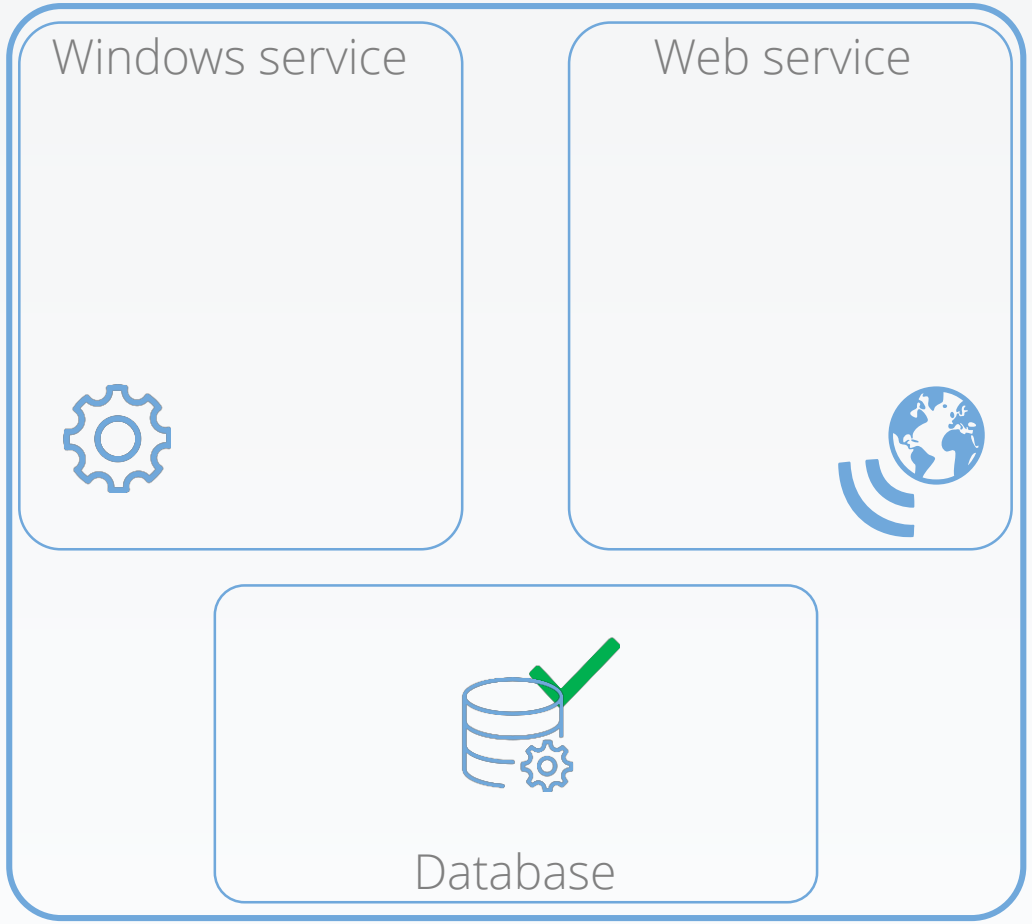
WSUS clients



Updates journey within a WSUS server

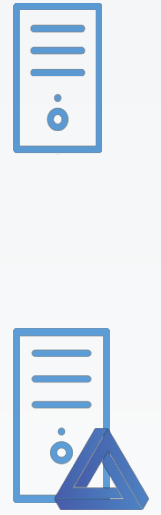
4. Updates are approved, either by an admin or by automatic approval rules

Microsoft Update



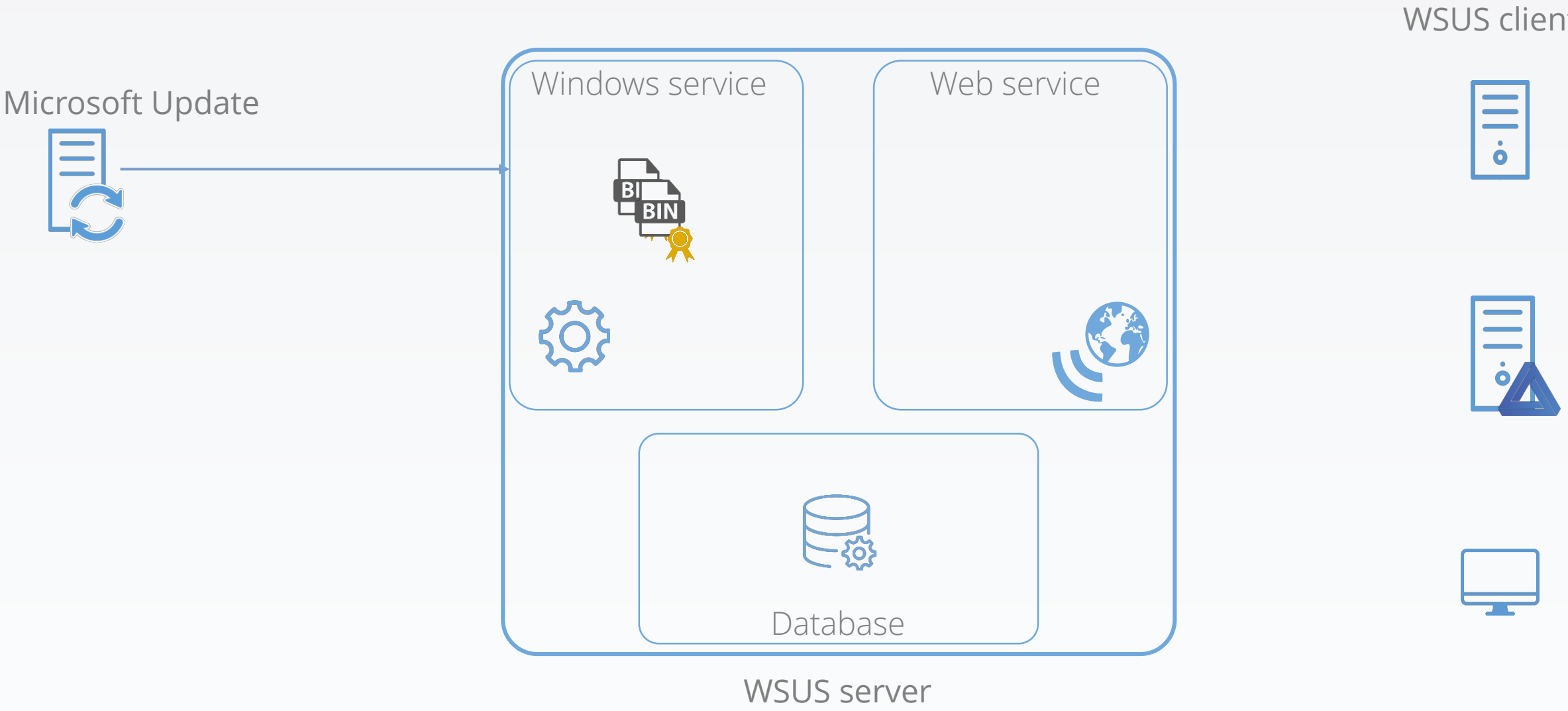
WSUS server

WSUS clients



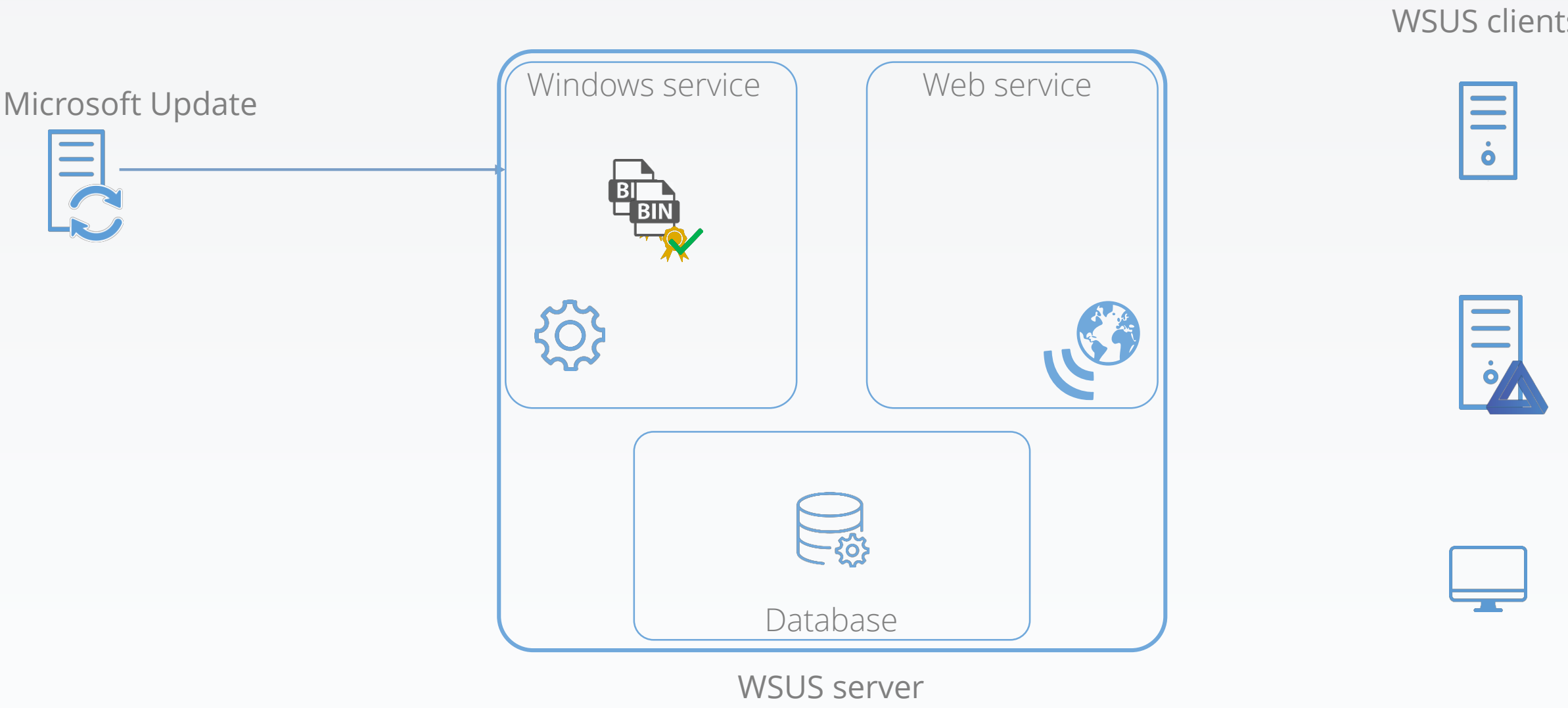
Updates journey within a WSUS server

5. Approved updates binaries (psf, cab, exe, ...) are downloaded



Updates journey within a WSUS server

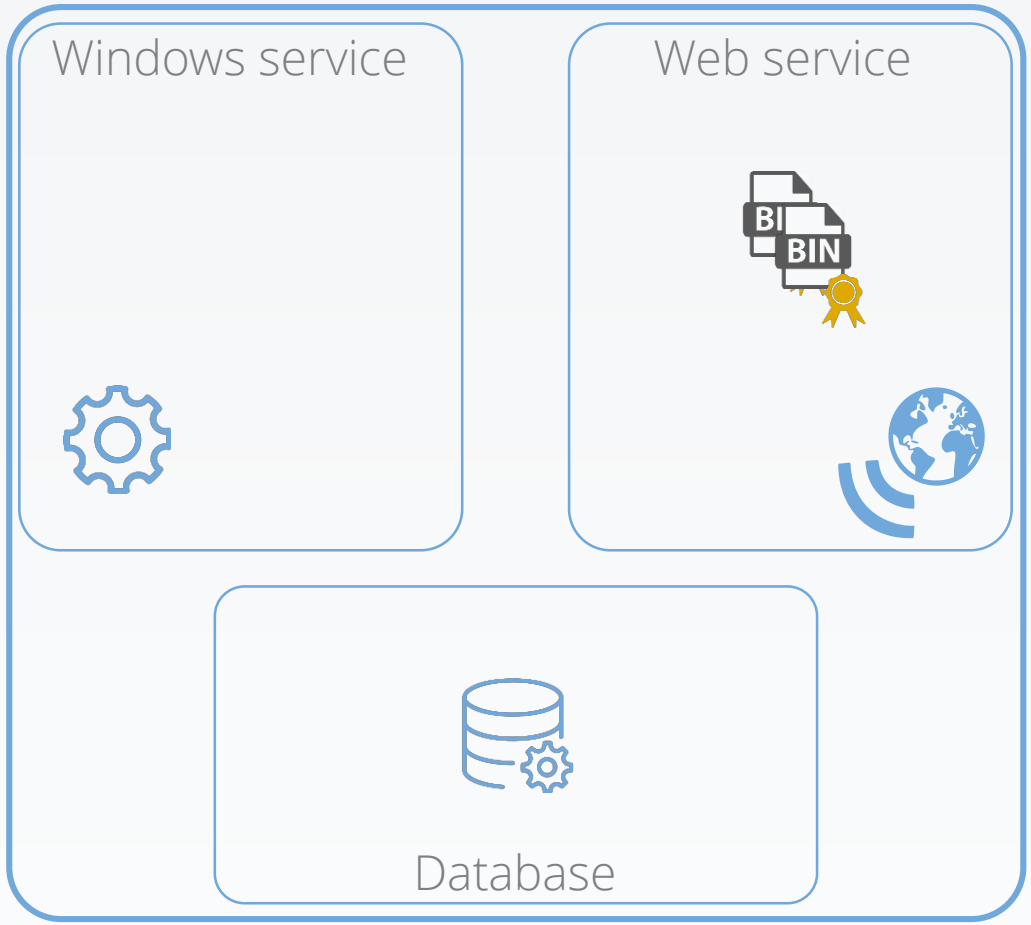
6. Each binary signature is checked



Updates journey within a WSUS server

7. Each binary is stored for the Web service to be able to get them

Microsoft Update

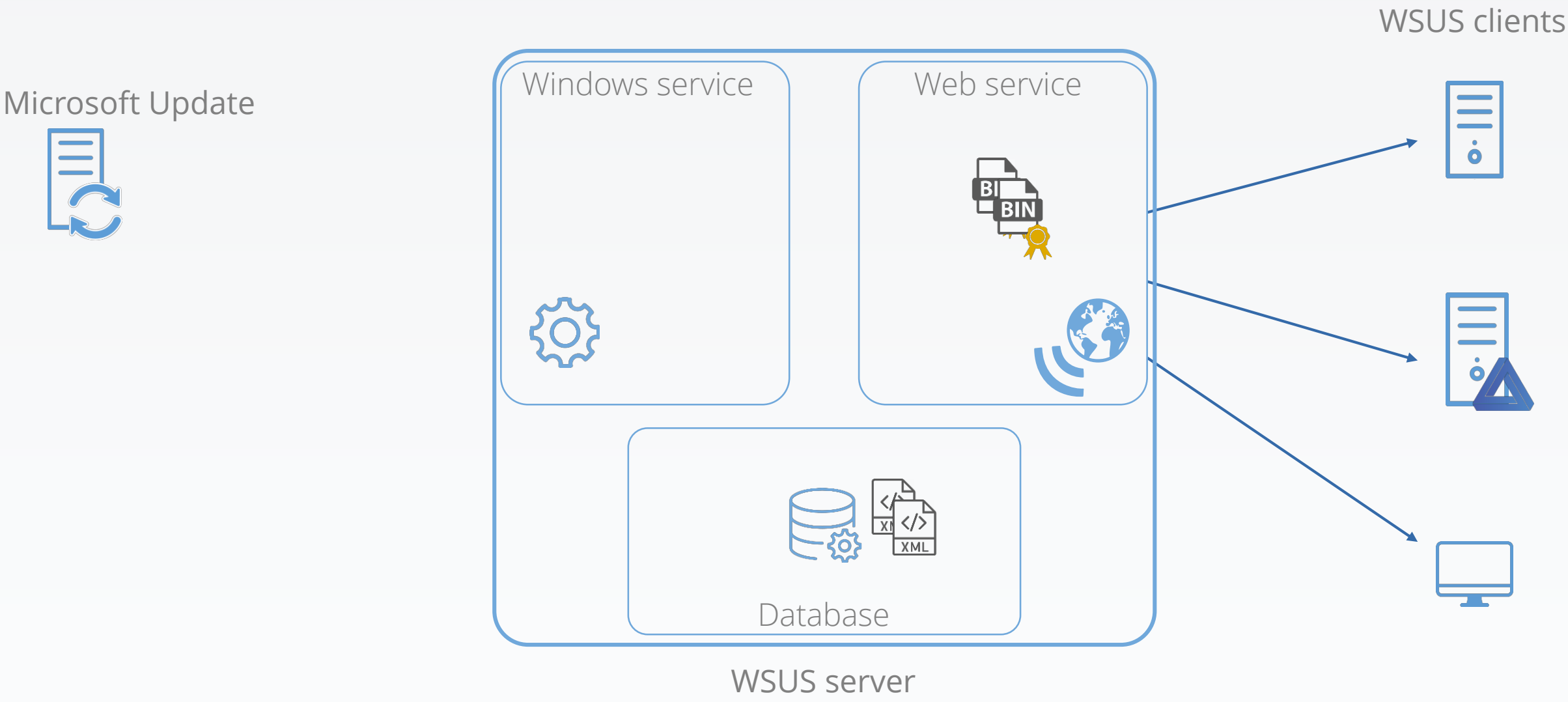


WSUS server

WSUS clients

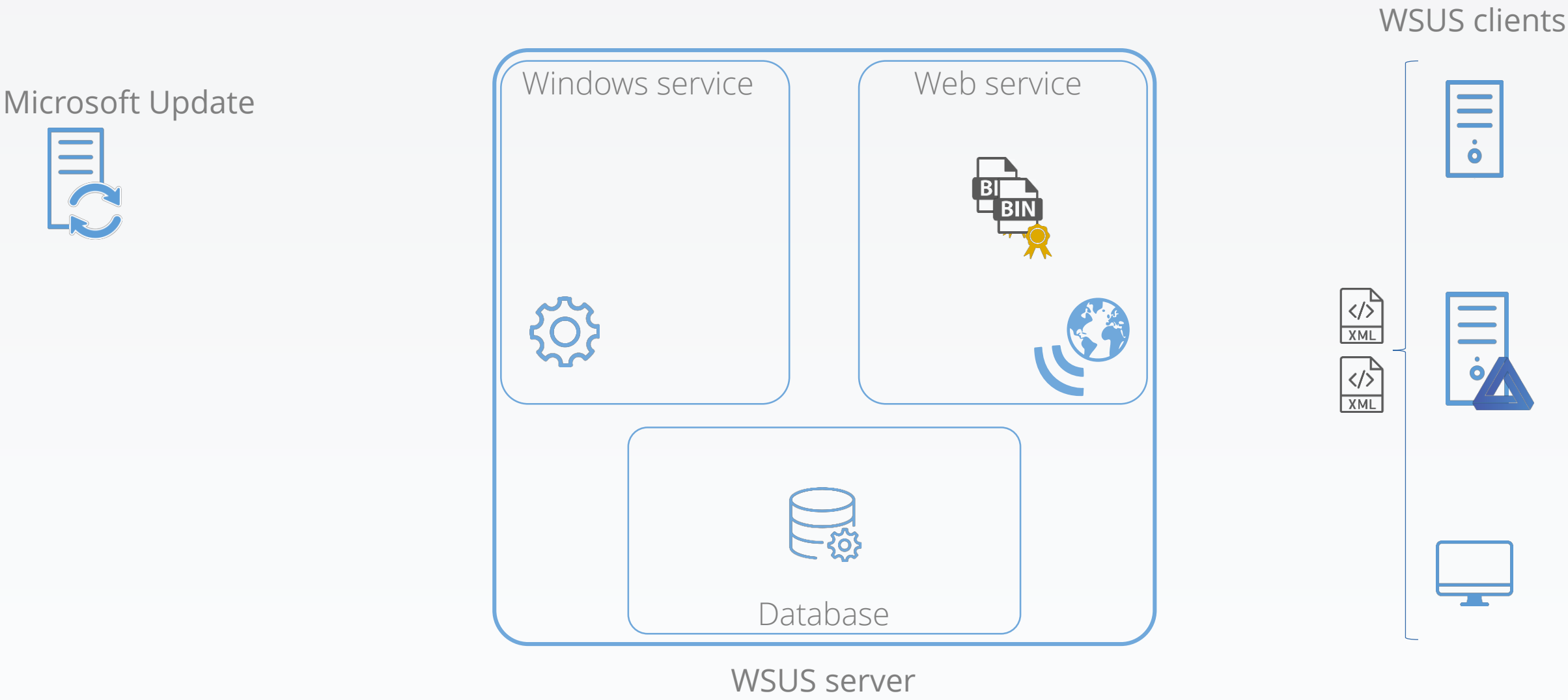
Updates journey within a WSUS server

8. Clients are looking for new updates ; Web service gets approved updates metadata from the database



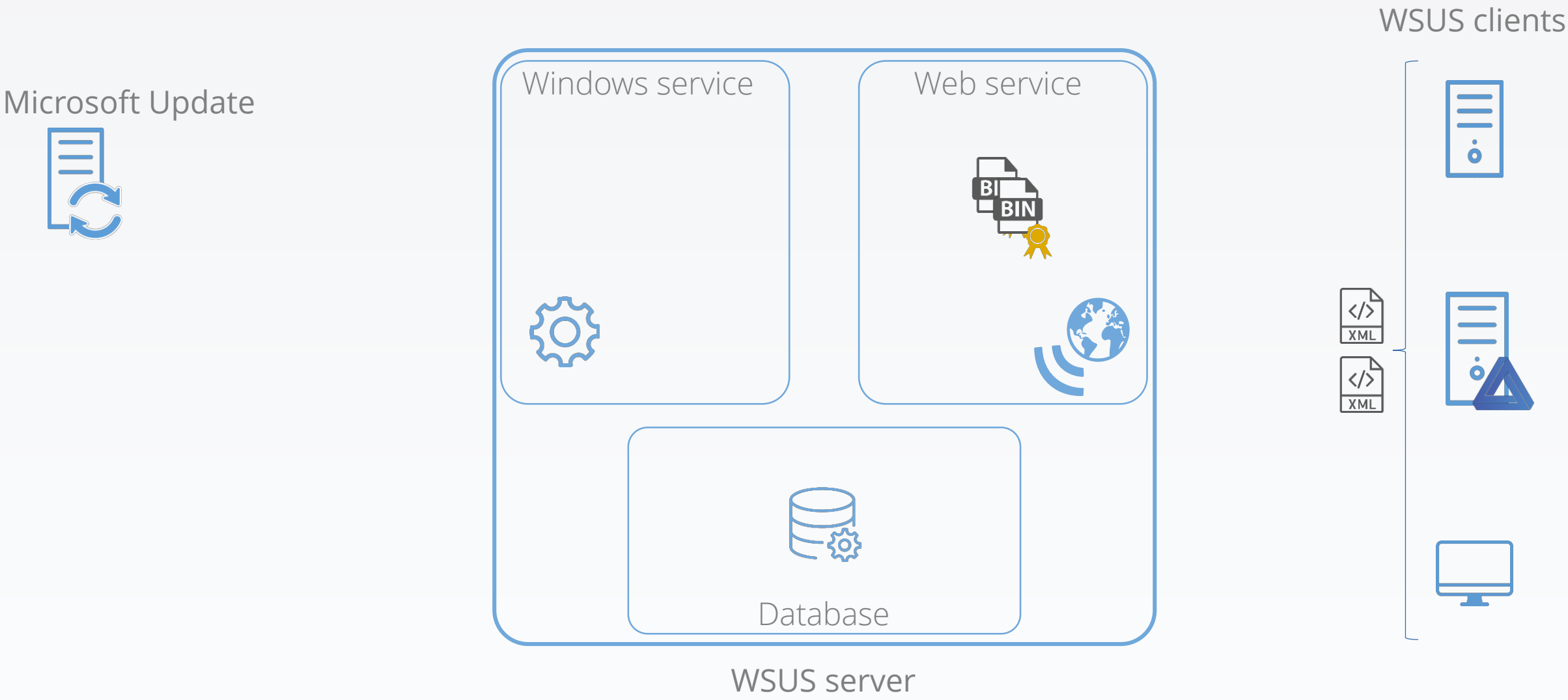
Updates journey within a WSUS server

9. Web service transmits the metadata to the WSUS clients



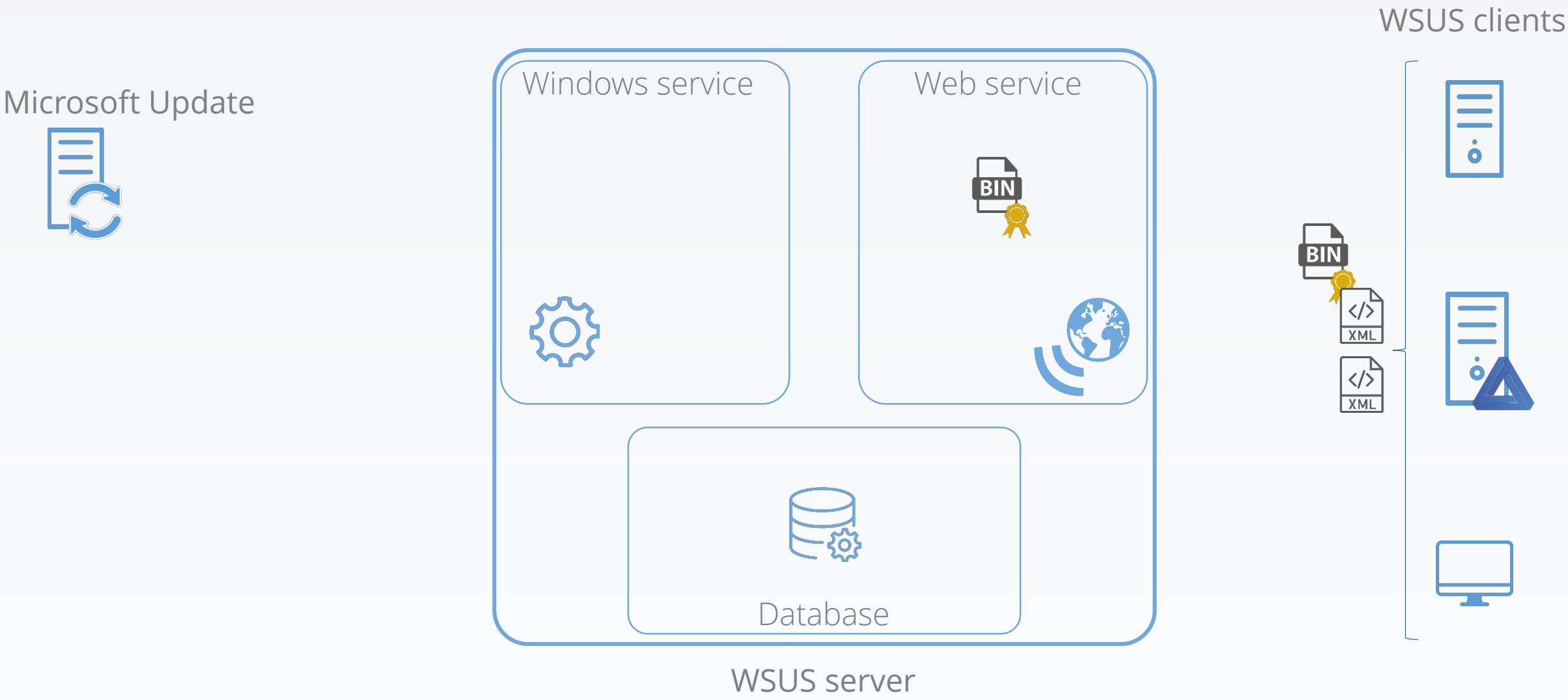
Updates journey within a WSUS server

10. Each client evaluates if the updates is installable



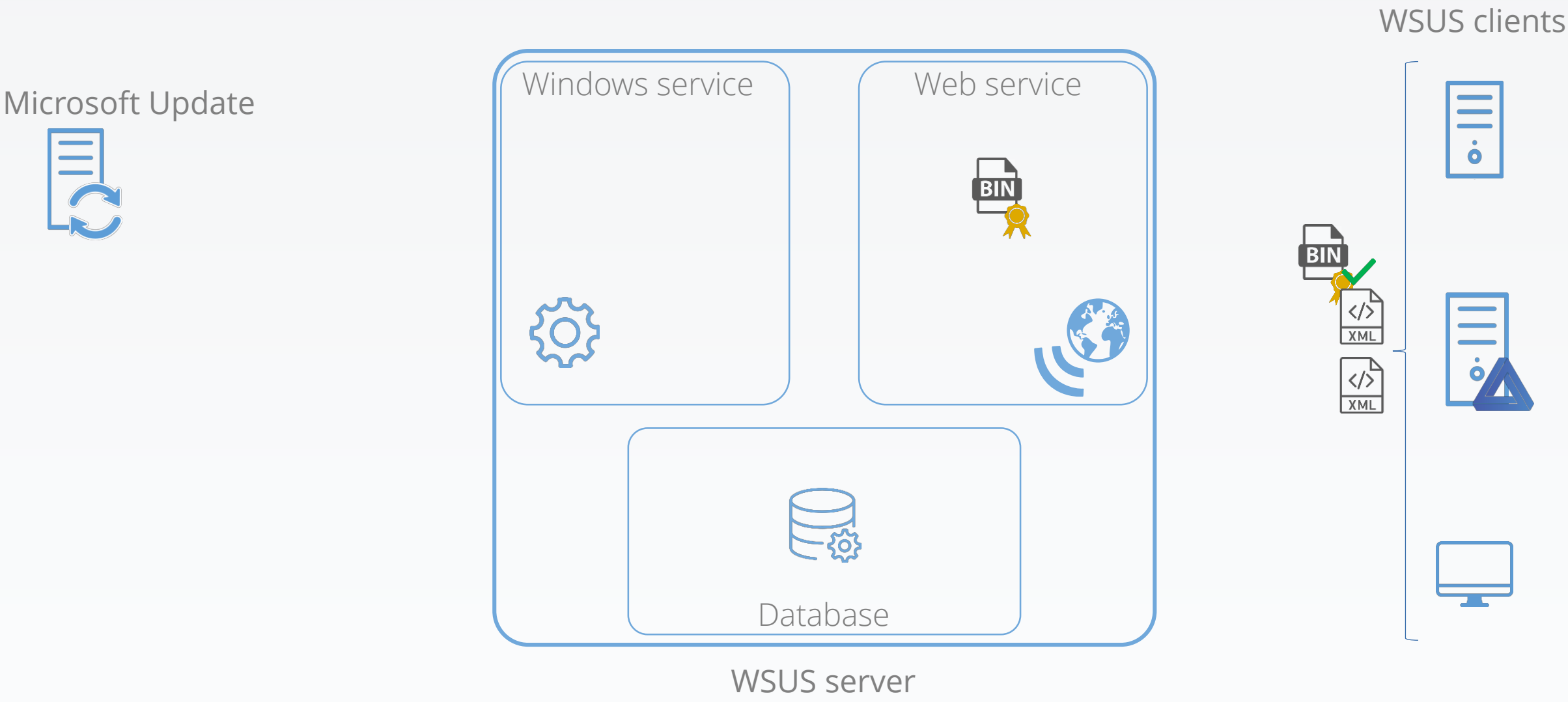
Updates journey within a WSUS server

11. If an update is installable on a client, the associated binary is downloaded



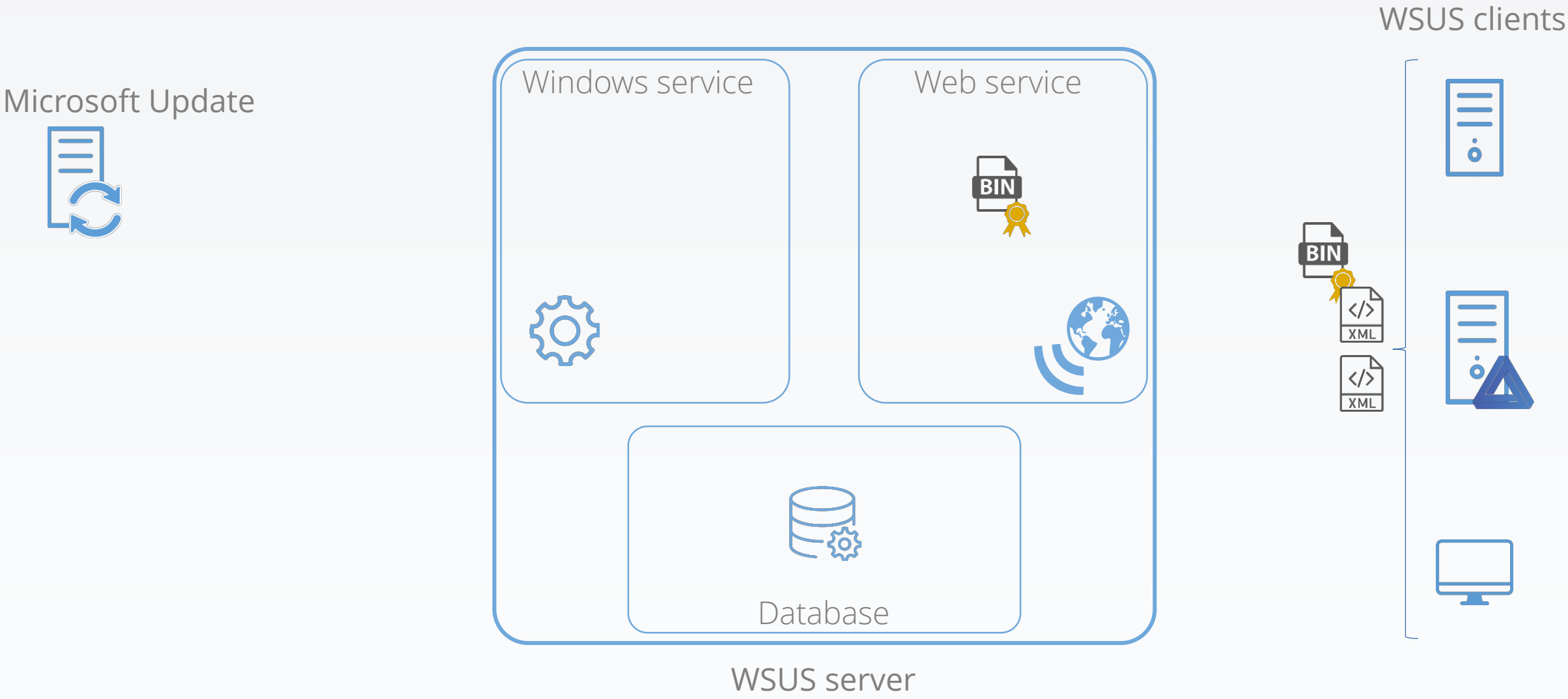
Updates journey within a WSUS server

12. Each downloaded binary's signature is checked

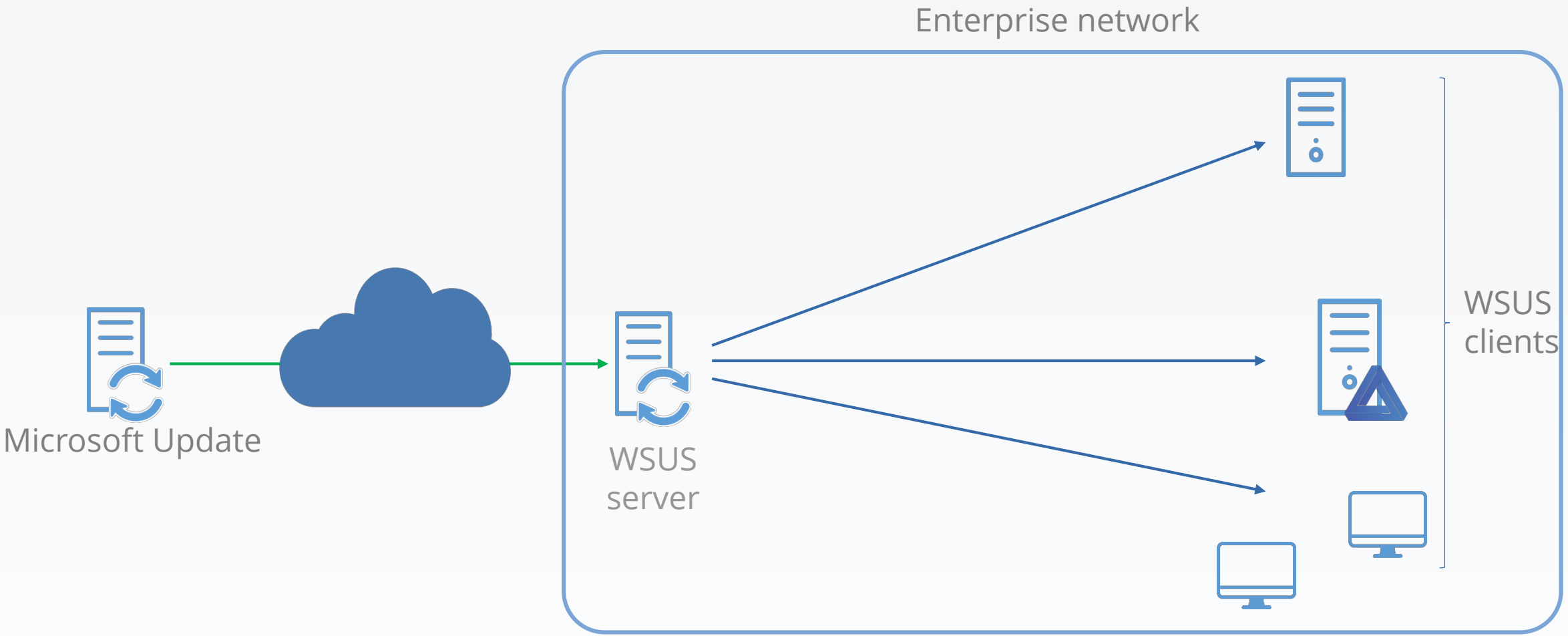


Updates journey within a WSUS server

13. Each binary is executed, with SYSTEM privileges, with possible command line parameters from the metadata

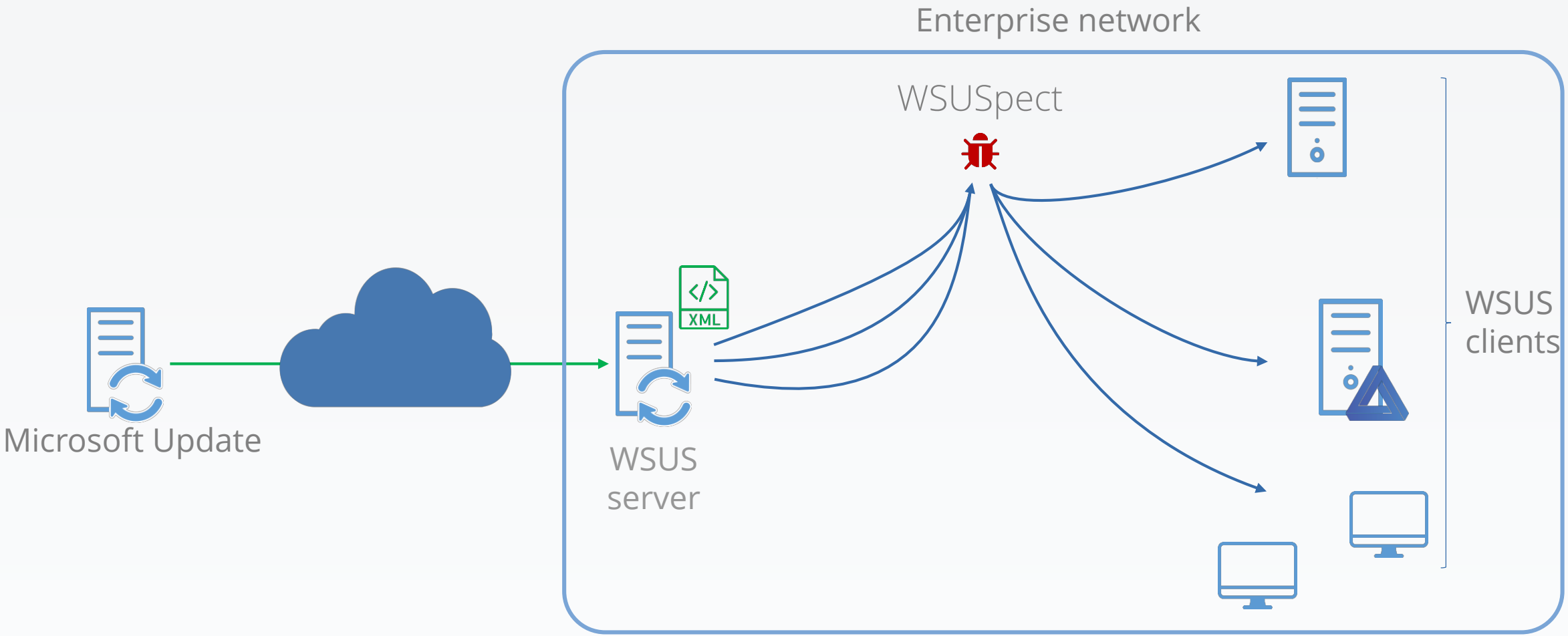


WSUS attacks: Black Hat USA 2015, WSUSpect



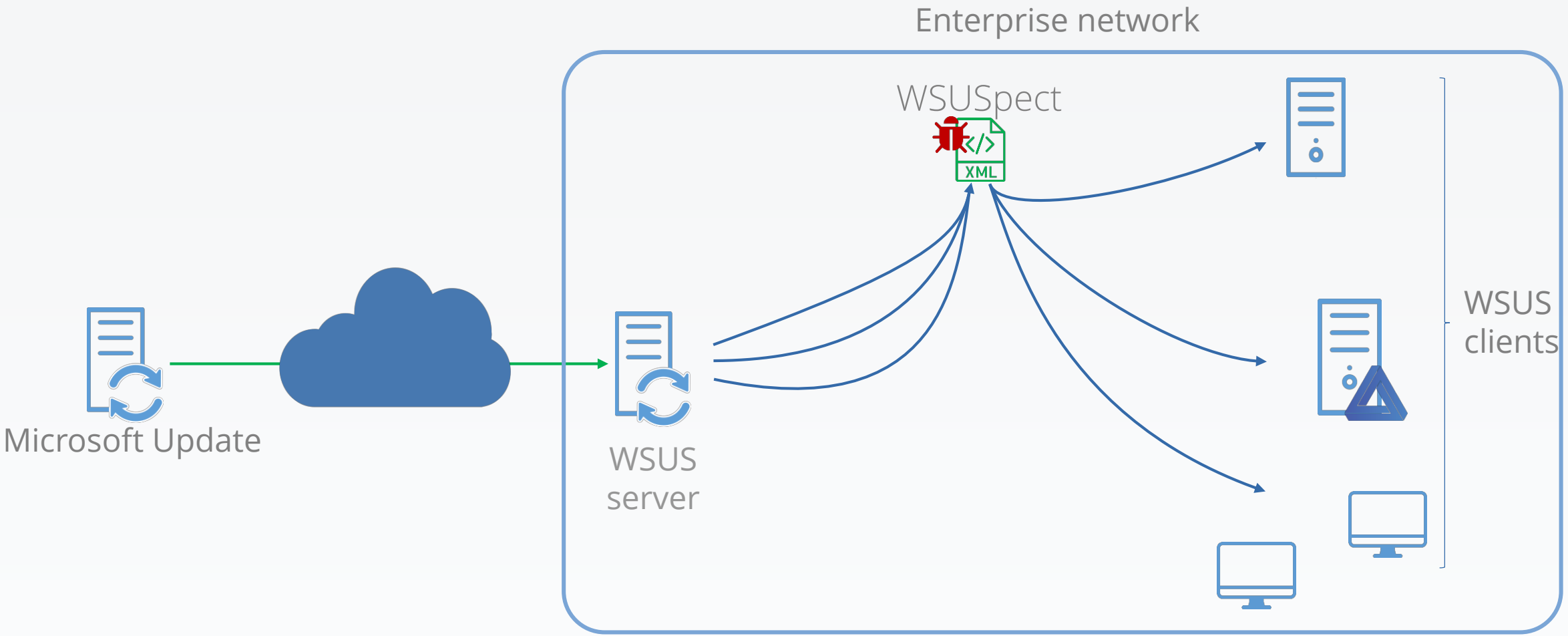
State-of-the-art

1. Get a mitm position



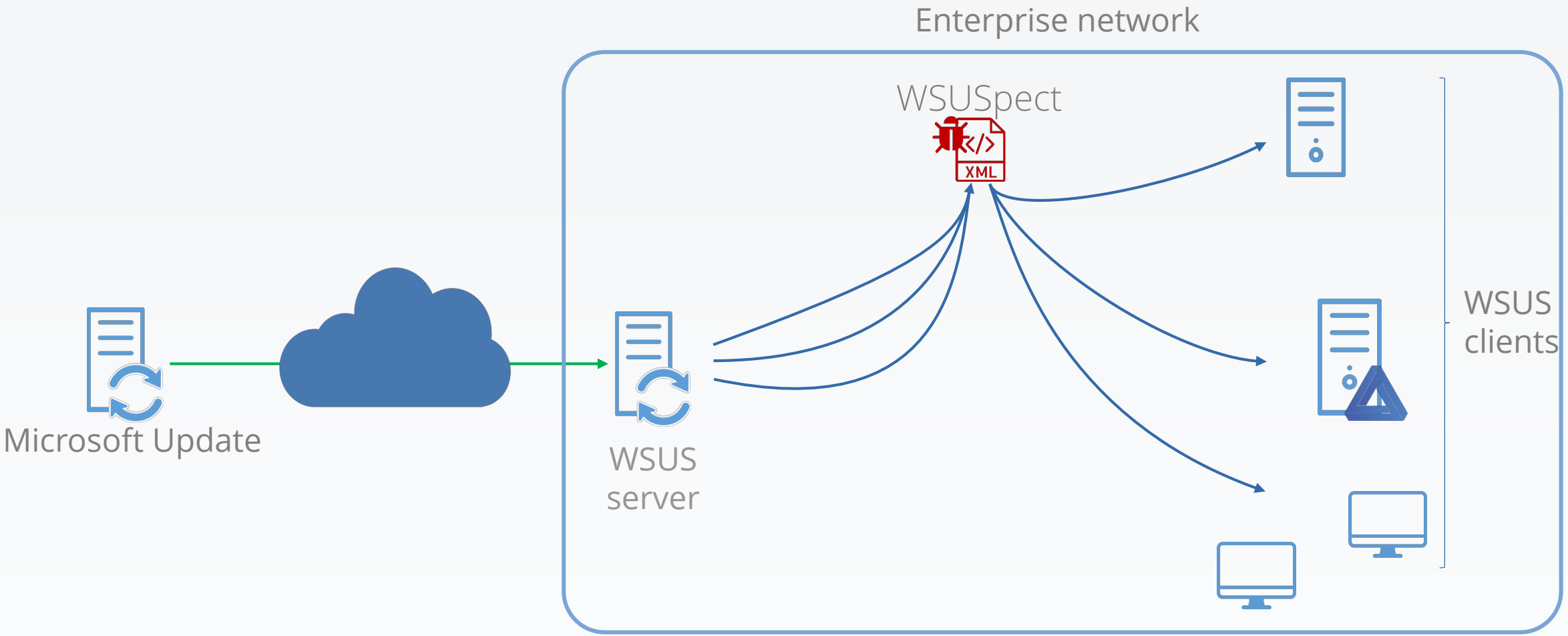
State-of-the-art

2. Intercepts new update queries



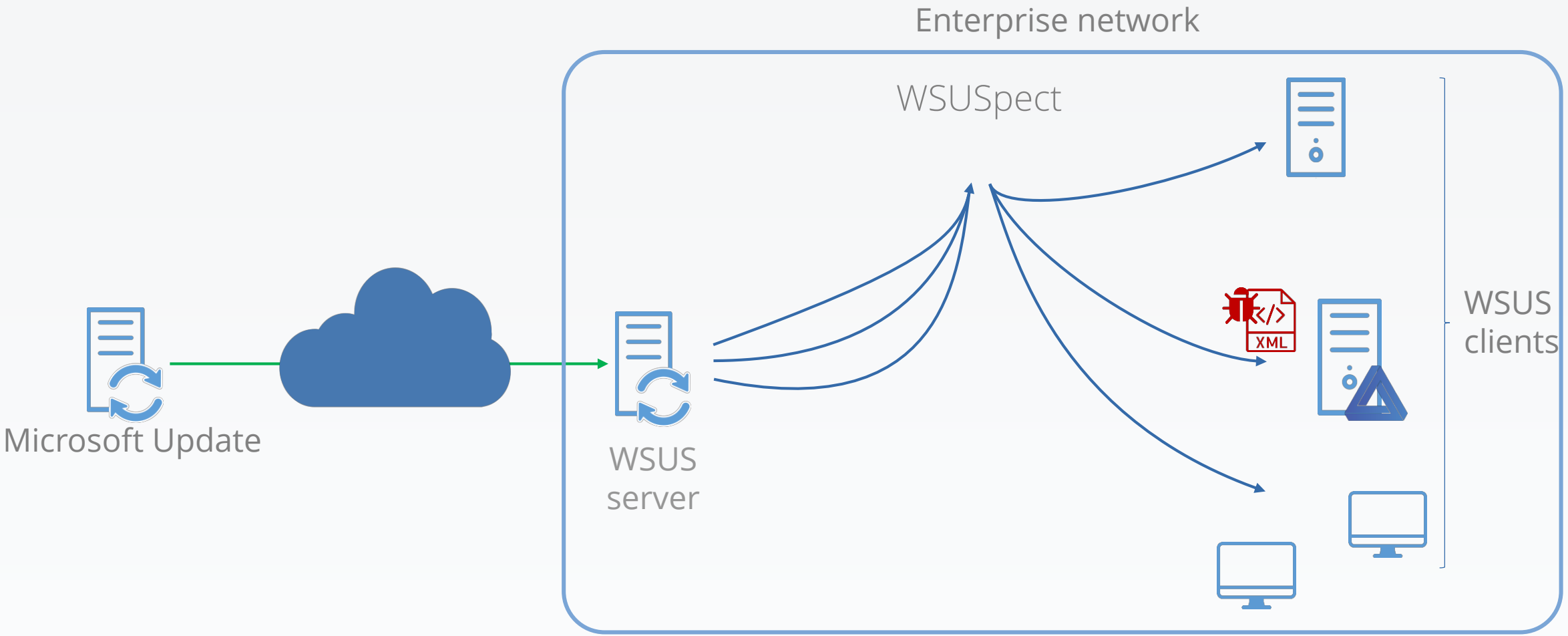
State-of-the-art

3. Infects the on-network metadata with a new, malicious update



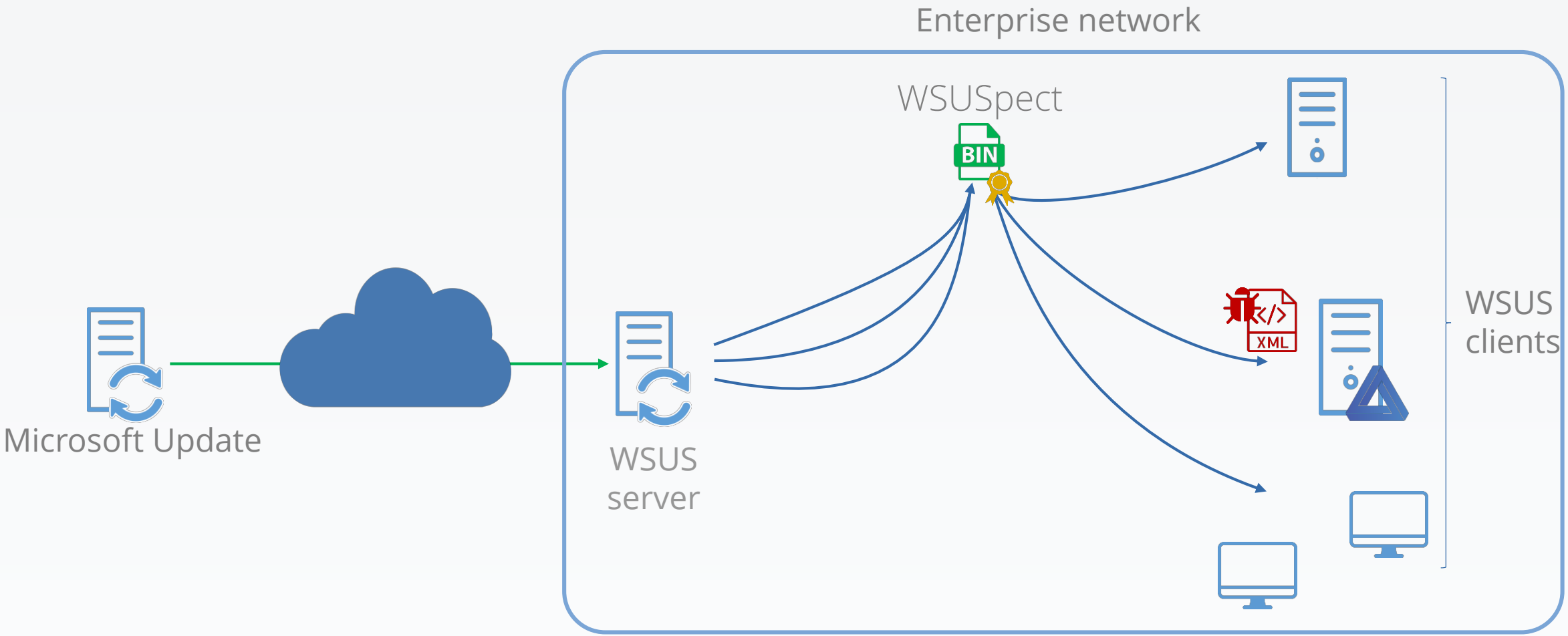
State-of-the-art

4. The client sees a new available and installable update



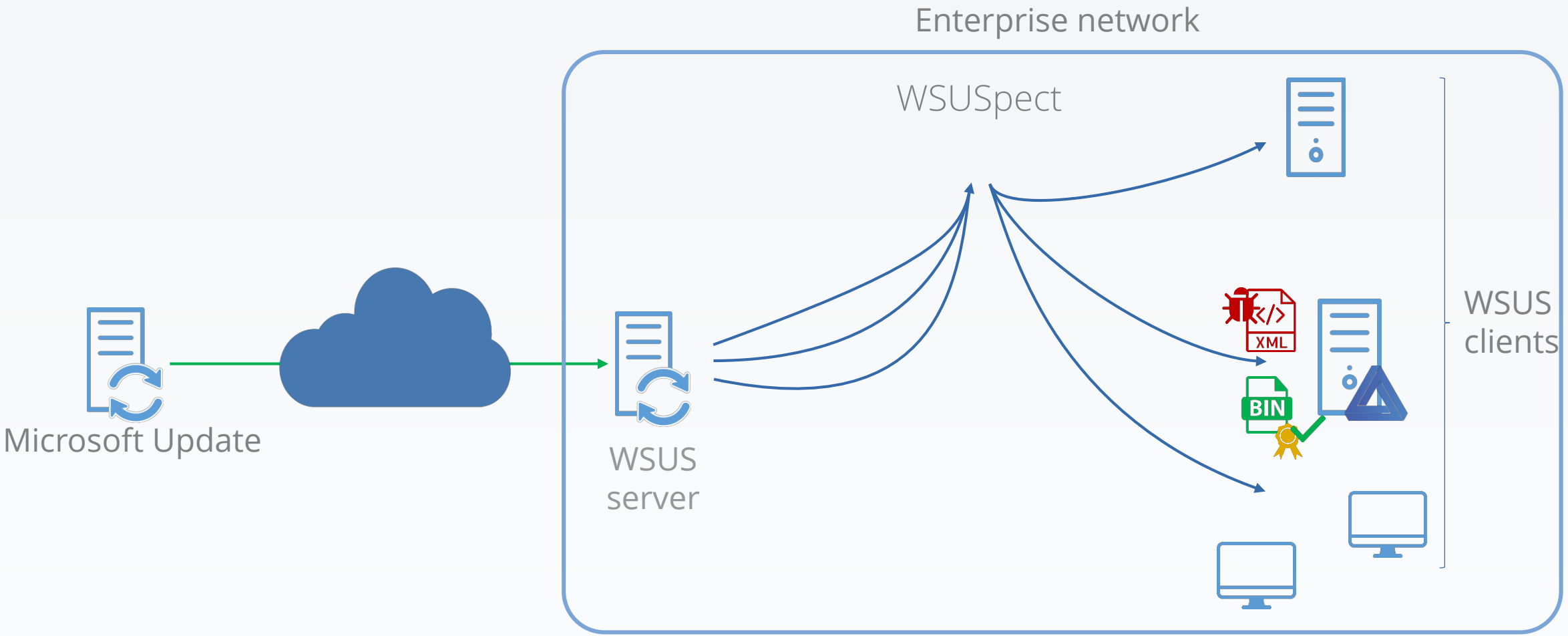
State-of-the-art

5. Fetches the related binary

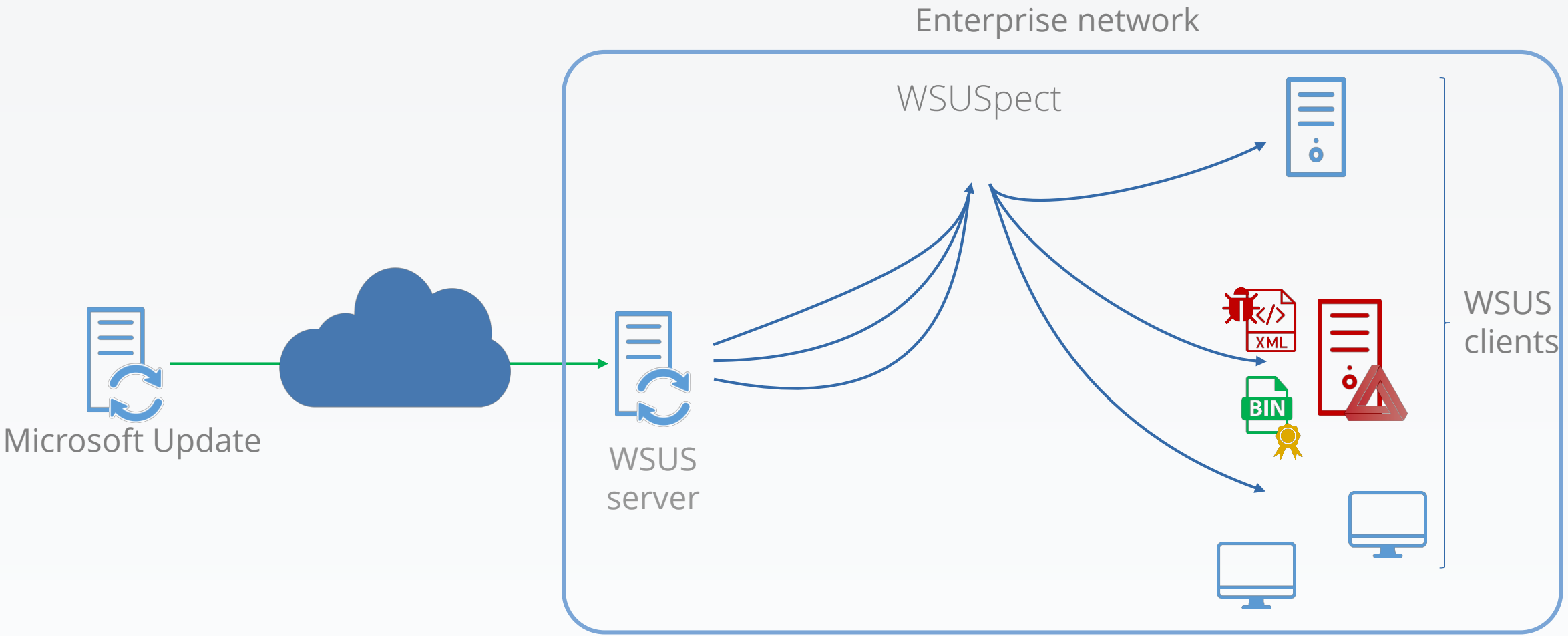


State-of-the-art

6. Checks if binary signature is okay: it is.



7. Installs the binary, with SYSTEM privileges, with metadata command-line arguments



WSUS attacks: Black Hat USA 2015, WSUSpect

Awesome attack!

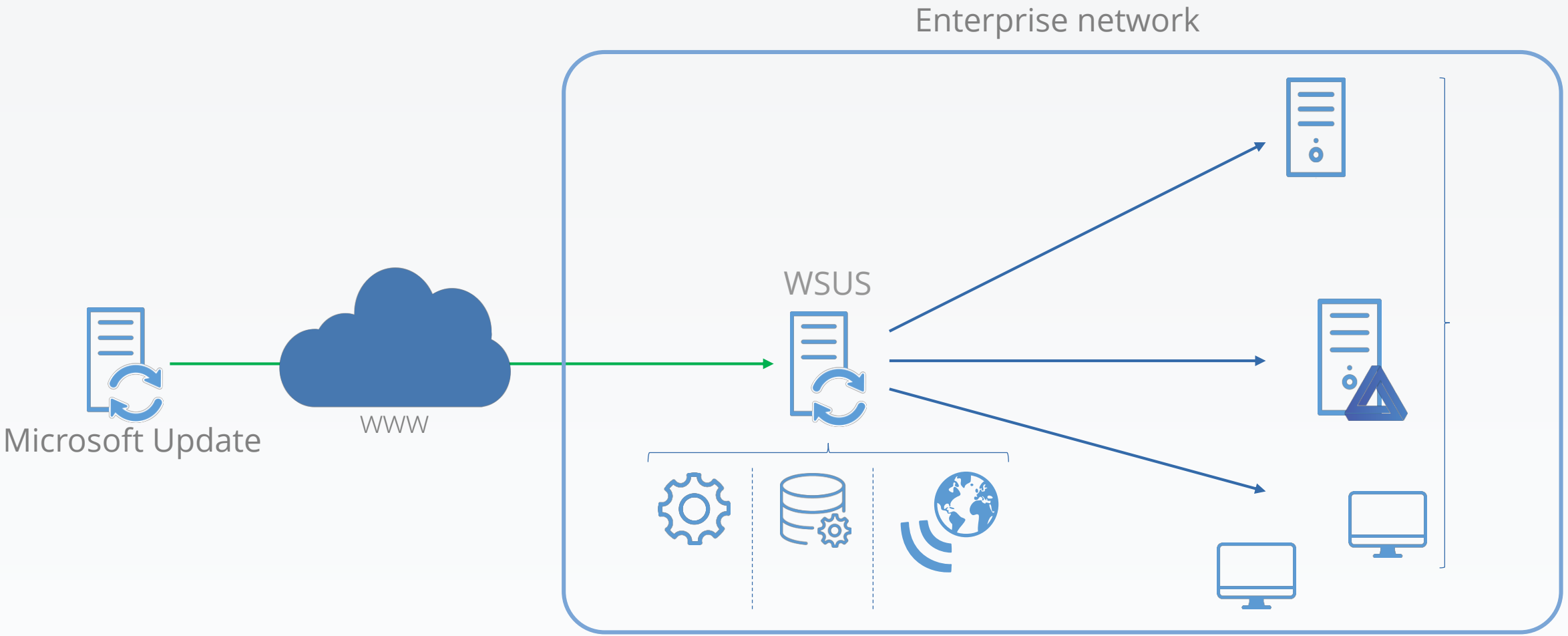
But some limitations:

- Gain a mitm position
  - Meaning no network limitation is in place
- Get a useful one
  - Meaning TLS has to be disabled

➡ Doesn't give us access to the disconnected network ☹

Introducing WSUSpendu[@]

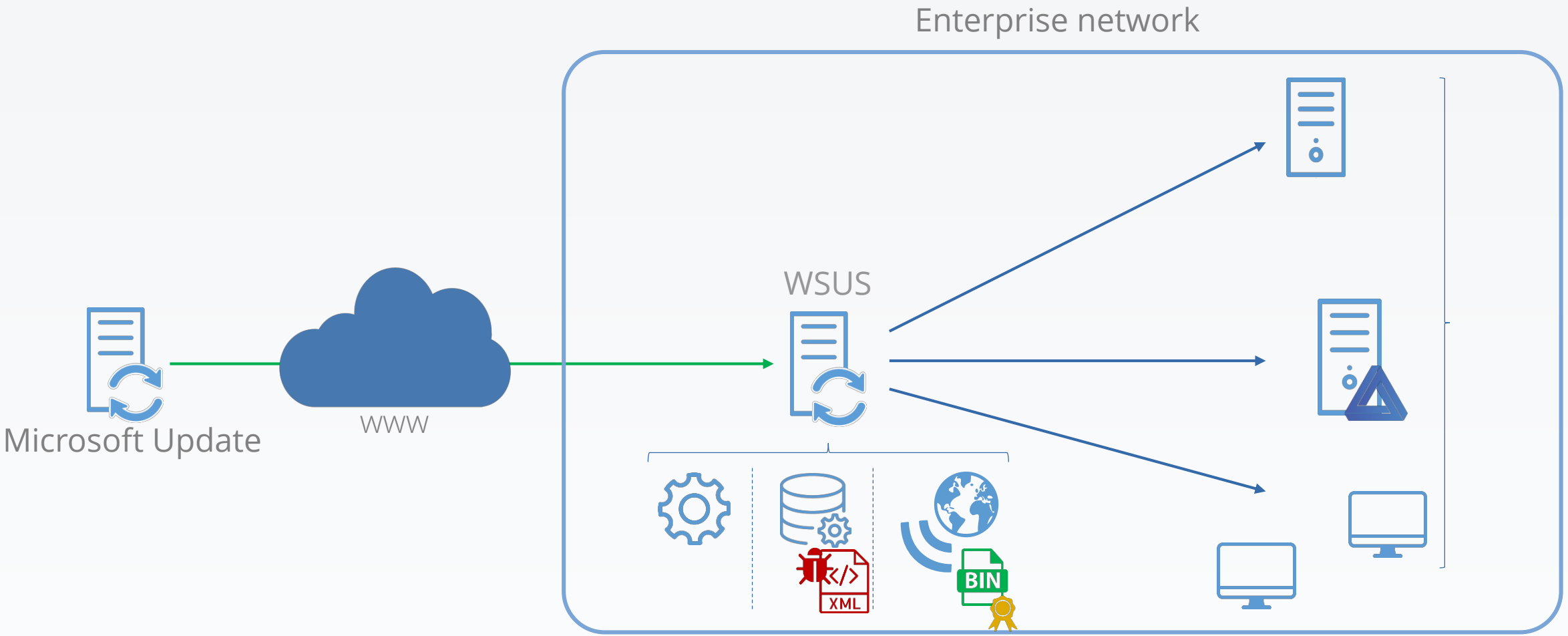
Open-source: https://github.com/AlsidOfficial/WSUSpendu



[@] Thx Maman

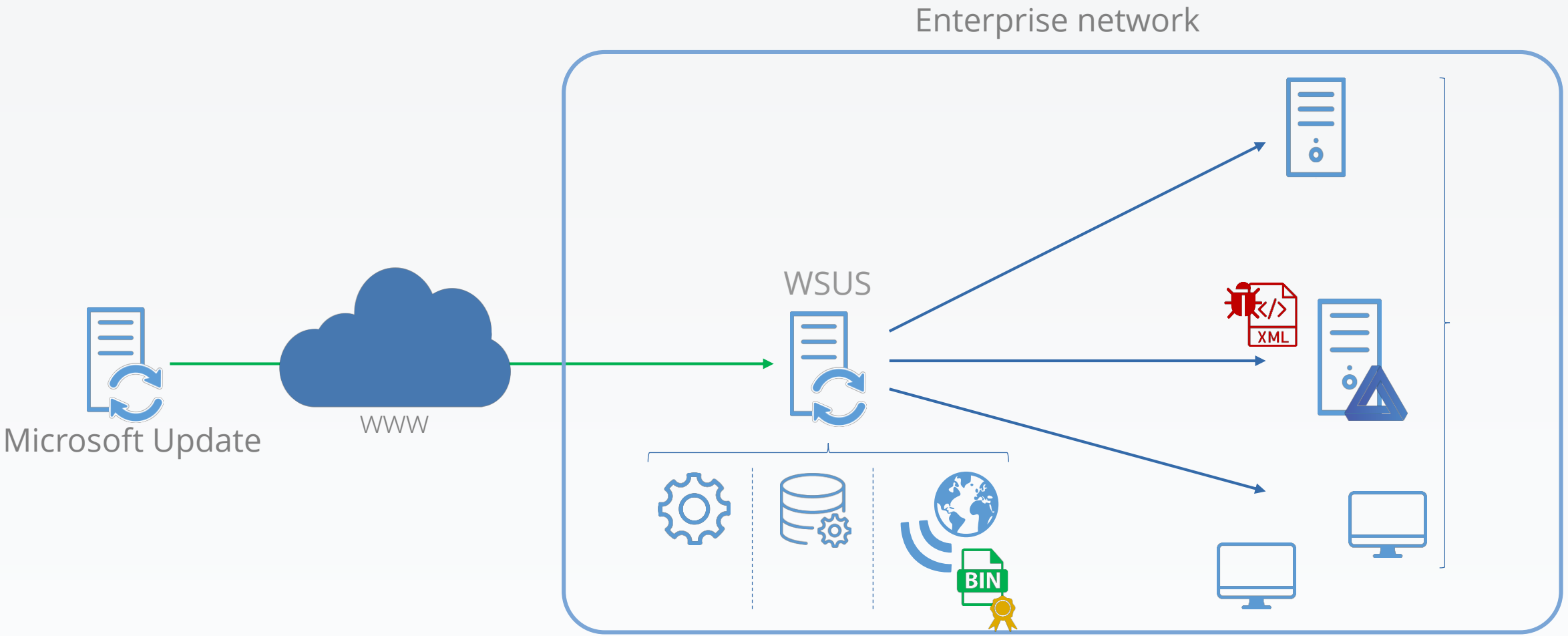
Introducing WSUSpendu

1. Injects update metadata in the database, signed binary in the Web service



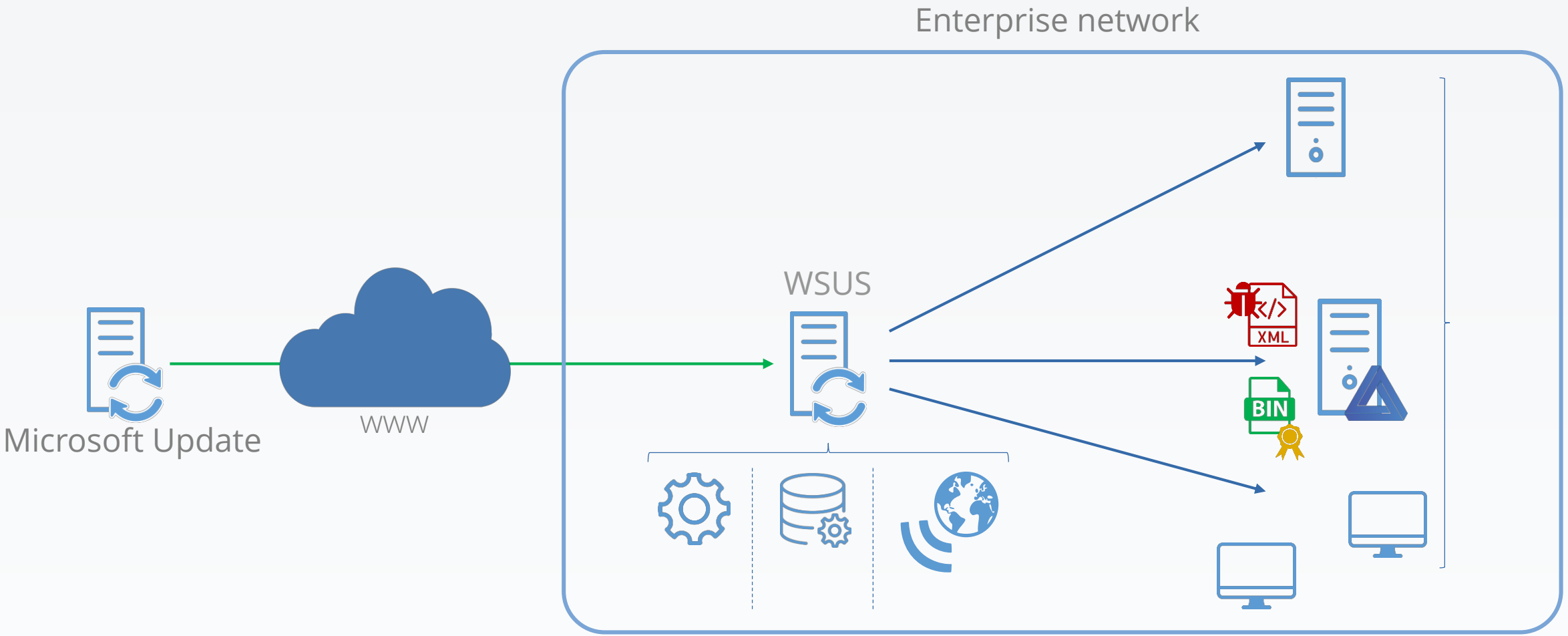
Introducing WSUSpendu

2. The client sees a new available and installable update



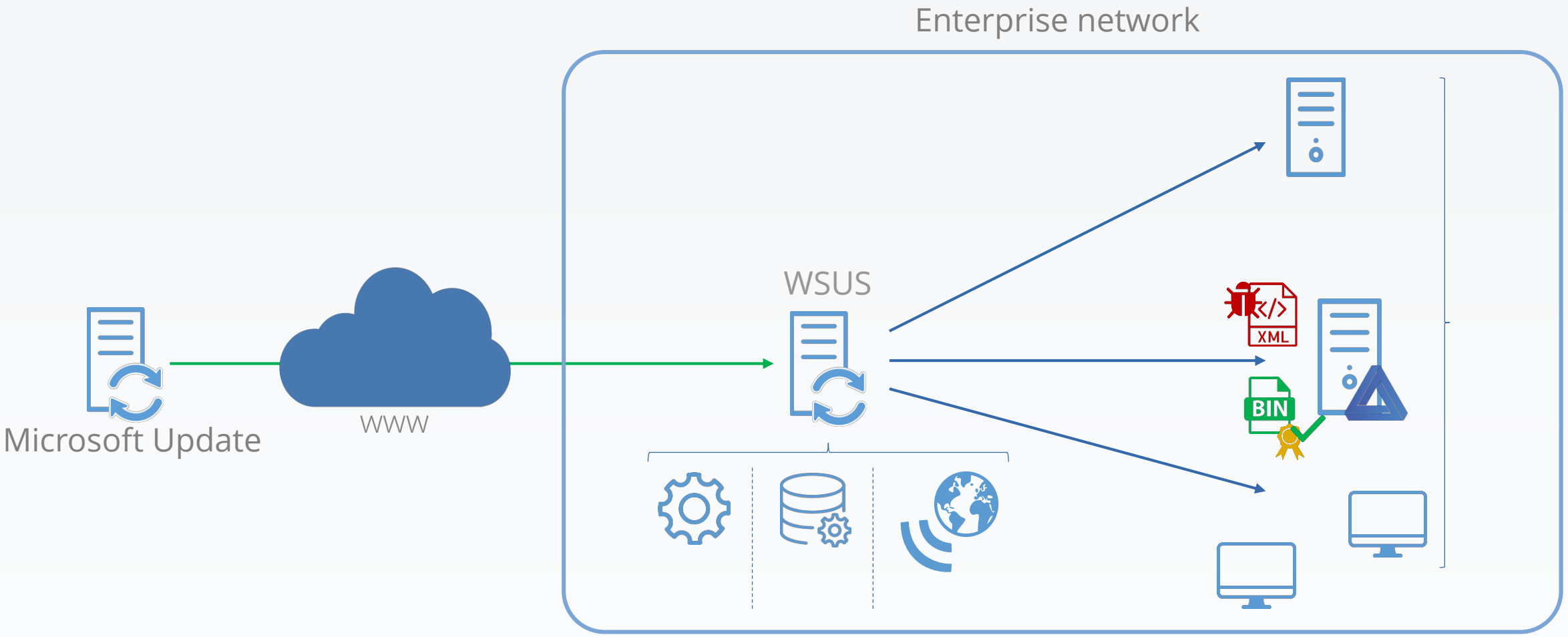
Introducing WSUSpendu

3. Fetches the related binary



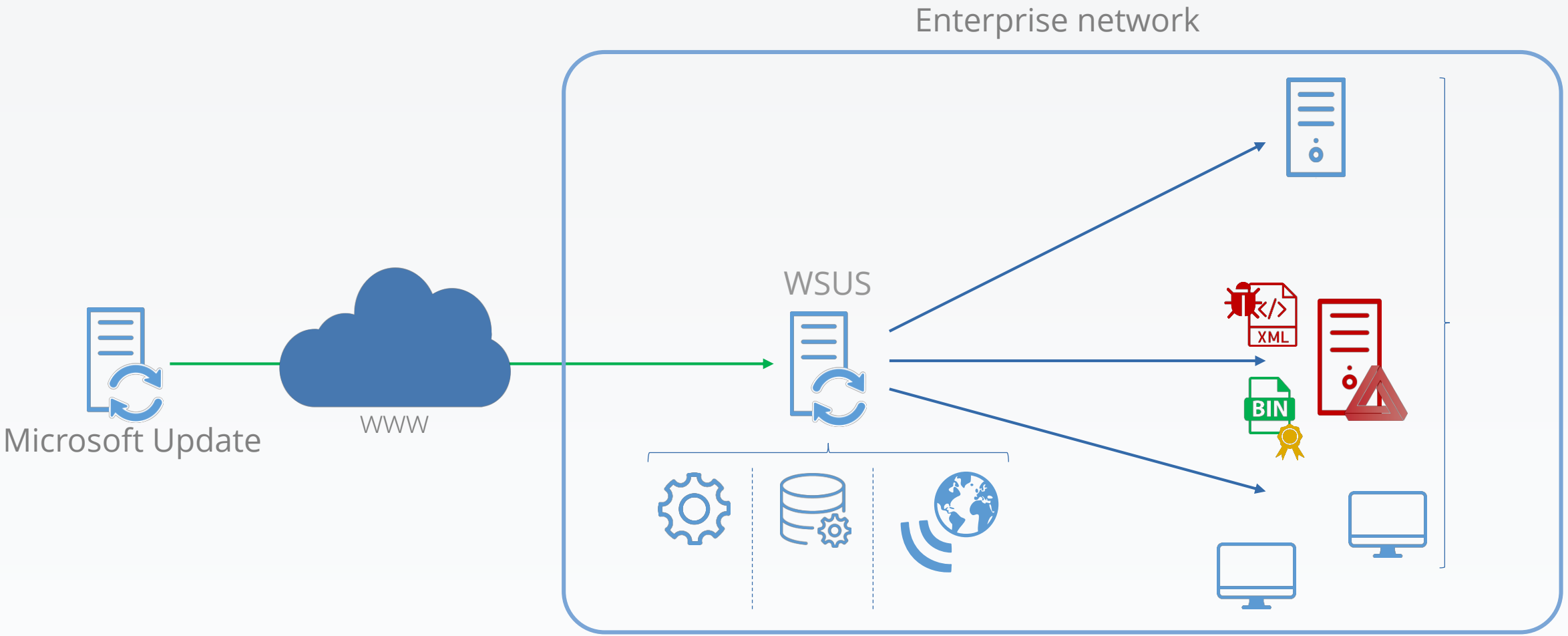
Introducing WSUSpendu

4. Checks if binary signature is okay: it is.



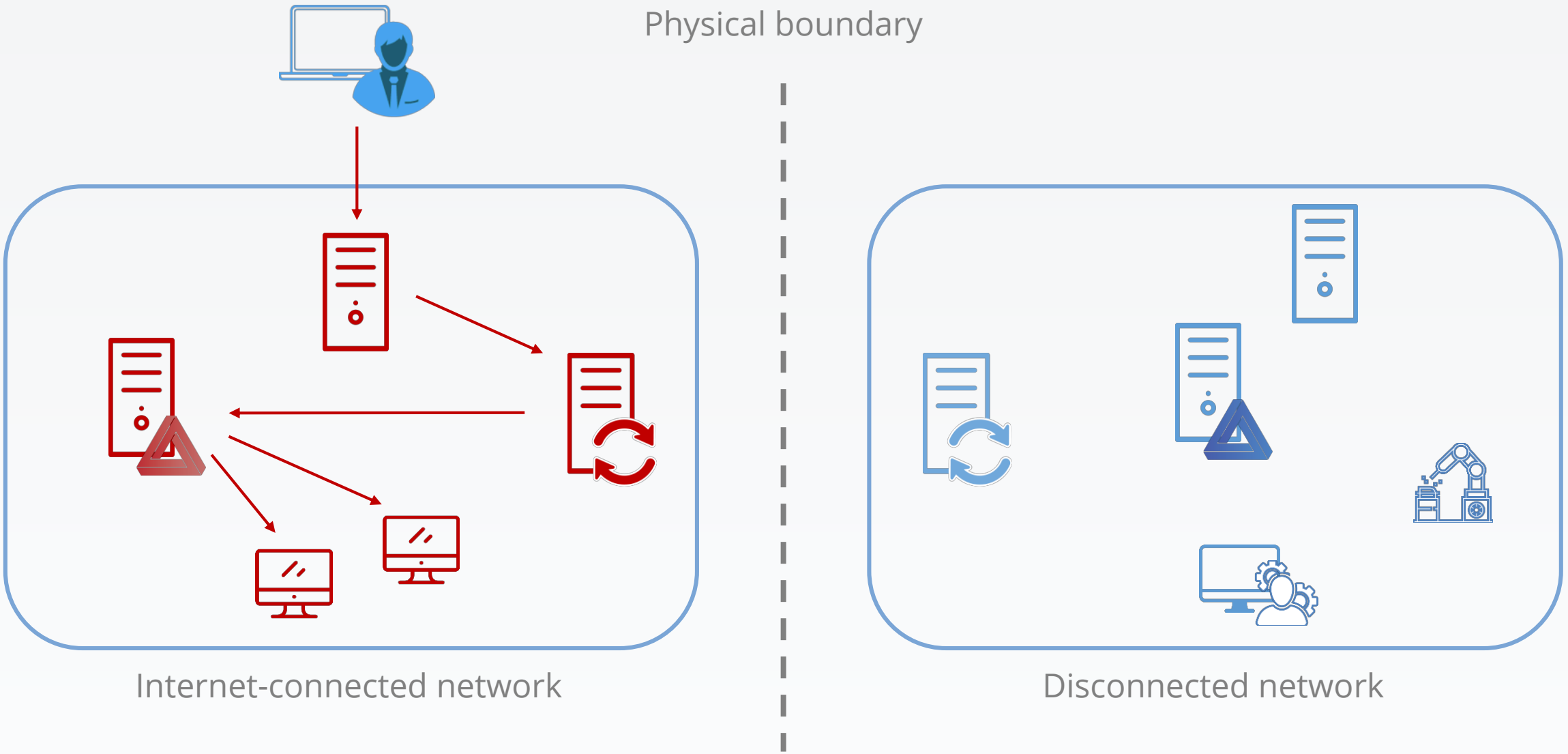
Introducing WSUSpendu

5. Installs the binary, with SYSTEM privileges, with metadata command-line arguments



Demonstration…

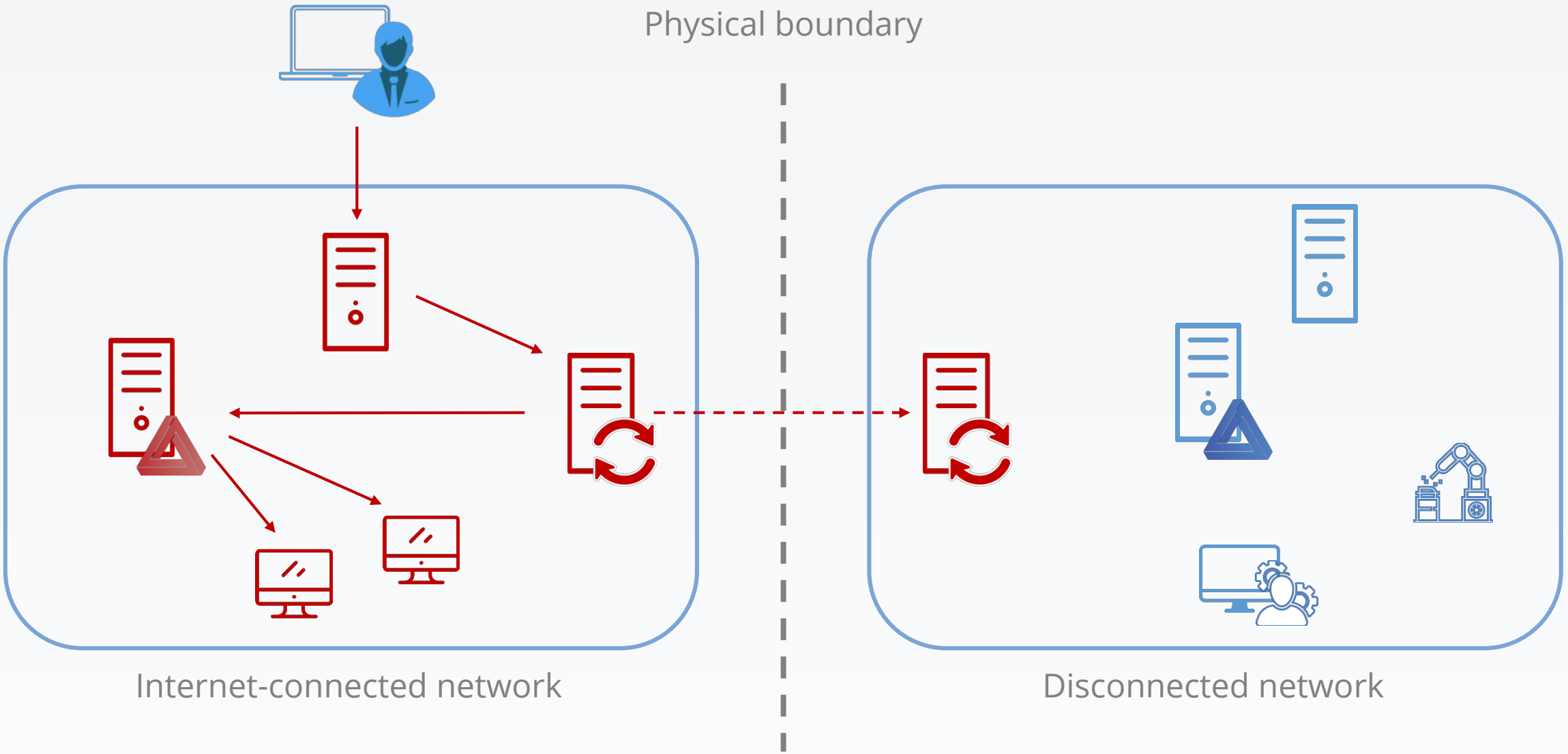
Compromise a connected network



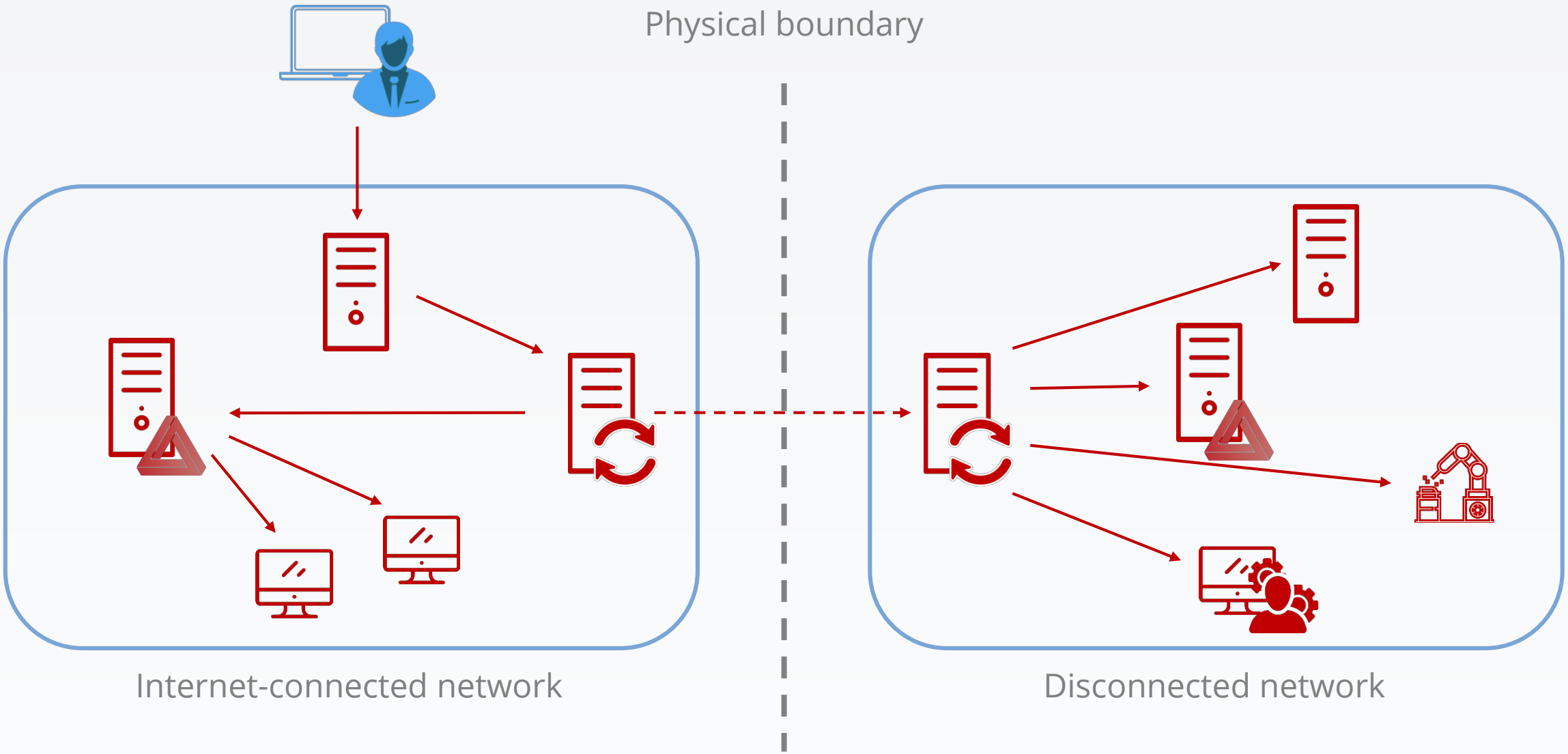
We need to go deeper...

Demonstration…

Compromise a disconnected network



Compromise a disconnected network



Conclusion

~~Stop updating~~ ☺

Control relationship WSUS server → clients

ROMAIN COLTEL

ANSSI

YVES LE PROVOST

Thank you all.