Understand Cisco IOS XR Software Maintenance Updates (SMUs)

Contents

Introduction

This document describes Software Maintenance Updates (SMUs) for routers that run Cisco IOS® XR software.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco IOS® XR software
- Cisco IOS® XR software installation and upgrade procedures

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Related Products

This document can also be used with these hardware versions:

- Cisco 9000 Series Aggregation Services Routers - ASR 9001, 9006, 9010, 9906, 9910, 9912, and 9922 Routers
- Cisco Carrier Routing System (CRS-1 and CRS-3)
- Cisco NCS 6000
- Cisco NCS 5000 and 5500
- Cisco XRv9000

SMU Management

Cisco Software Manager

The Cisco Software Manager (CSM) provides Cisco IOS XR SMU recommendations to users and reduces the effort that it takes for you to manually search, identify, and analyze SMUs that are needed for a device. The CSM can connect to multiple devices and provide SMU management for multiple Cisco IOS XR platforms and releases.

The CSM 3. x is a server application that can be installed on various Linux distributions. Through CSM Server users can orchestrate the installation of any Cisco IOS XR software package, that includes SMUs.

Note: Refer to the [Cisco Software Manager v3.3](#) information page for more information.

The CSM 2. x is a standalone Java application that can be installed on Microsoft Windows, Macintosh, and UNIX systems. The CSM supports all Cisco platforms that run Cisco IOS XR. Support for CSM 2. x was discontinued after the introduction of CSM 3. x.

Note: Refer to the [Cisco Software Manager User Guide](#) for more information.

Cisco IOS XR SMU Overview

An SMU is a software patch that is installed on the Cisco IOS XR device. The concept of an SMU applies to all Cisco IOS XR hardware platforms.

A Cisco IOS XR SMU is an emergency point fix, which is positioned for expedited delivery and which addresses a network that is down or a problem that affects revenue.

When the system runs into a software deficiency (bug), Cisco can provide a fix for the particular problem in the base current Cisco IOS XR release. This is a substantial difference from the classic Cisco IOS software, which has no capability to apply a single fix in the base current release.

An SMU is built on a per release and per component basis and is specific to the platform. This means that an SMU for a CRS router cannot be installed on an ASR 9000 router. An SMU built for Cisco IOS XR software Release 4.2.1 cannot be applied to a system with Cisco IOS XR software Release 4.2.3. An SMU built for a P image cannot be used on a system built for a PX image.

SMUs are provided for urgent, "showstopper" issues only. The fix provided by the SMU is then integrated into the subsequent Cisco IOS XR software maintenance release. Cisco strongly encourages you to upgrade to the subsequent maintenance release.

SMUs are Package Installation Envelope (PIE) files that are similar in functionality and installation to the feature PIEs for manageability (MGBL), Multiprotocol Label Switching (MPLS), and Multicast.

Types of SMUs

Production SMU

A production SMU is an SMU that is formally requested, developed, tested, and released.

Production SMUs are intended for use in a live network environment and are formally supported by the Cisco TAC and the relevant development teams. Production SMUs are provided for critical live operation issues on a supported maintenance release. Production SMUs are characterized by package types, impact and criticality, and restart or installation impact type.

Production Software Maintenance Updates (SMU) are provided on user requests on supported maintenance releases for service that impacts issues observed in production or during maintenance release validation, for which there is no feasible workaround. Software bugs identified through software recommendations or Bug Search Tools are not a basis for Production SMU requests. Cisco continuously reviews software bugs that affect supported maintenance releases and provides Proactive Production SMU requests when Cisco deems them necessary. Cisco reserves the right to maintain strict control over Production SMU delivery, to maintain the stability of the code base and prevent collateral damage.

Production SMU Types

Mandatory production SMUs are critical fixes that are mandatory in order to maintain the proper functionality of the device.

Recommended production SMUs are critical fixes that are strongly recommended in order to maintain the proper function of the device. They typically consist of platform and infrastructure SMUs and composite SMUs. You can access recommended production SMUs at the [Download Software Center](#) if you are a registered Cisco Connection Online (CCO) user.

Optional production SMUs provide fixes that are desirable but are not required in order to maintain stability. They are typically deployed based on bugs within specific features. You can download optional production SMUs from the [File Exchange](#) (releases earlier than 4.2.3) or from the [Download Software Center](#) (Release 4.2.3 and later).

Production SMU Restart Types

Each SMU has a restart type of dependent or reboot:

- SMUs that are parallel process restart SMUs are considered a **dependent** restart type. Their installation impact can be either hitless or traffic loss.
- SMUs with a **reboot** restart type can have an install method of parallel reload or of in-service software upgrade (ISSU) if ISSU is supported by the operating system and the platform.

Each SMU has a README file that documents the restart type and installation impact of the SMU.

Dependent SMU (Parallel Process Restart)

Dependent SMUs require process restarts during activation. One or more processes are restarted on nodes in parallel. SMUs of this type are marked as restart type dependent in the Readme file that accompanies the SMU.

The SMU also has an installation impact of hitless or traffic loss. In the Download Software Center, SMUs of this type include the installation impact of either hitless or traffic loss in the file information section.

Reboot SMU with Parallel Reload Install Method

Some SMUs require the router to reboot in order to safely activate the patch. Such SMUs are marked as restart type reboot in the Readme file for the SMU. The Readme file is posted on the File Exchange or as part of the tarball on the recommended SMUs portal on CCO. In the Download Software Center, SMUs of this type include the designation of Reload SMU in the file information section.

An SMU can impact key base components in the operating system and require a reload of the device for these reasons:

- Changes to the Minimum Boot Image (MBI)

- Changes to the kernel
- Changes to the Network Processor (NP) or Packet Switching Engine (PSE) microcode

If an SMU requires more than ten different process restarts, the SMU is created as a reboot SMU for safety reasons and for system stability.

Reboot SMU with ISSU Install Method

ISSU provides the ability to upgrade the router software with no outage on the control plane and with minimal outage (generally within several seconds) on the forwarding plane. ISSU is a user-initiated and user-controlled process that uses Cisco Nonstop Forwarding (NSF) with stateful switchover (SSO). ISSU upgrades an SSO-NSF-capable image from a lower to a higher version or installs ISSU SMUs with minimal downtime, degradation of service, or loss of packets. Not all Cisco IOS XR platforms and Cisco IOS XR versions support ISSU. Refer to Release Notes documentation for your product to verify the support for ISSU.

To achieve ISSU, the Cisco IOS XR software uses the ISSU Minimal Disruptive Restart (iMDR) software. iMDR is the warm reload technology that allows line cards to be upgraded as if they were redundant in hardware. iMDR effectively separates the CPU and CPU memory of the line cards from the forwarding ASICS, memory, and Ternary Content Addressable Memory (TCAM) of the line cards. Think of the CPU and CPU memory as the software portion of the line cards, and think of the forwarding ASICS, memory, and TCAM as the hardware portion of the line cards. iMDR allows the software portion of the cards to be upgraded to a new version while the hardware portion continues to perform its duties under the old version. After the software portion upgrades itself and stages the information needed in order to upgrade the hardware portion, it performs a flush to replace the old version with the new version. This flush generally takes no more than several seconds, which is the only time there is a disruption of service. The exact time required for the flush depends on the hardware configuration of your router.

An SMU delivers a software change to the user in the least possible time. Before ISSU support, SMU installations resulted in either restart of one or more processes, or reload of one or more nodes. ISSU minimizes the operational impact that a user experiences.

Not all Reload SMUs qualify to be ISSU SMUs. Certain changes to the kernel, ROMMON, memory carving, and other infrastructure areas cannot be achieved with a warm reload; in such instances, the router must undergo a standard reload in order to load such an SMU.

To perform an ISSU SMU upgrade, use the **issu** keyword with the **install activate** command. If an ISSU SMU is activated without the **issu** keyword, the SMU is installed with the parallel reload method.

To remove the Software Maintenance Updates (SMU) package from the committed software using ISSU, use the **install deactivate issu <smu2> <smu1>** command in XR EXEC mode. If an ISSU session is in progress, this command is blocked until the ISSU session is complete. If the ISSU SMU is deactivated without the issu keyword, the SMU is deactivated with the parallel reload method. To commit the change, use the command **install commit**.

Note: Before you perform the ISSU-SMU deactivation, ensure that you consider the dependencies on the relevant SMUs already present on the router. This consideration will avoid conflicts between components at the time of the ISSU operations.

The ISSU process can be performed in a prompted mode in order to ensure and verify that there is no service degradation throughout the process. Or, the ISSU process can be unprompted, where the phases are executed automatically with no user intervention.

View the output of the **show install package pie detail** admin command in order to identify the SMU type.

ISSU SMUs are identified by ISSU (quick) warm-reload in the Restart information field.

In the software download center, SMUs of this type include the designation of ISSU/Reload in the file information section.

Production SMU Installation Impact

Hitless

Most SMUs can be applied without impact to normal router operations (routing and forwarding) and are classified as hitless SMUs. Hitless SMUs are parallel process restart SMUs that can be activated without an effect on the operation of the device.

Traffic Loss

If an SMU addresses a problem within a routing protocol, the process that runs the protocol restarts when you apply the SMU.

If you use graceful restart extensions with default timers, traffic continues to be forwarded without interruption, and protocol sessions are re-established.

If you do not use graceful restart extensions, routing protocol sessions are terminated and restarted. Traffic is diverted away from the affected router when neighbors detect the session has terminated. If the loss of traffic is expected as a consequence of the SMU installation, the SMU is classified as a traffic loss type SMU.

Engineering SMU

An engineering SMU is a "private" SMU provided to a network administrator in order to address key and critical issues found during software qualification processes. They are built in order to verify a specific fix and only that fix. Engineering SMUs are not built from the product lineup and negate or do not include previous fixes in the same component.

Note: Engineering SMUs are not subjected to the full test suite applied to a production SMU and therefore are not supported outside of a lab environment. Support for such SMUs comes from the associated development teams. Do not use engineering SMUs in operational networks because the TAC is not able to support the SMU.

An engineering SMU is provided in order to test the validity of a fix in advance of the commitment of the actual fix or, potentially, in advance of the delivery of a formal production SMU. Engineering SMUs are removed after they are tested.

PSIRT SMU

In response to a critical, security-related issue, an SMU is released under the guidance of the Cisco Product Security Incident Response Team (PSIRT). PSIRT SMUs are provided on all affected, supported maintenance releases. PSIRT SMUs have a priority of urgency and are announced through a Security Advisory.

Bridge SMU

A bridge SMU is an SMU that is a prerequisite to an upgrade or downgrade to another Cisco IOS XR software release. Bridge SMUs are also referred to as mandatory upgrade or downgrade SMUs because they

must be installed before an upgrade or downgrade.

Refer to Cisco IOS XR General Information for procedures for each upgrade or downgrade and for details of any mandatory bridge SMUs.

Bridge SMUs are also included in the Cisco IOS XR software tar bundles located in Download Software Center for a particular release. The Cisco IOS XR software tar bundle includes all available PIEs for the release and any bridge SMUs for other Cisco IOS XR releases needed in order to perform the upgrade.

Umbrella SMU

An umbrella SMU is a collection of individual bug fixes included in one SMU package.

A new bug ID in the Distributed Defect Tracking System (DDTS) is assigned and is an aggregation of a set of bugs under that new umbrella bug ID. The release note of the umbrella bug ID includes a list of all bugs that the SMU fixes. This simplifies the software delivery model since a single SMU can fix many individual issues.

The terms combo SMU, umbrella SMU, and SMU pack refer to the same type of SMU.

The bug fixes that are included within an umbrella SMU can or can not be limited to a single component, although cross-functional umbrella SMUs that cross package boundaries are rare.

Umbrella SMUs can be provided for platform-dependent fixes or platform-independent fixes.

- A **platform-dependent** fix is an issue that pertains to one specific platform such as an ASR9000,
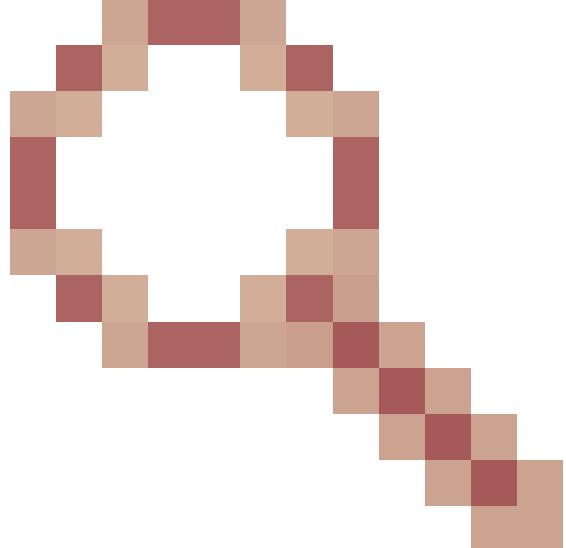
    CRS, or XR12K. For example, Cisco bug ID CSCud37351
    423 SMU Pack2 applies to ASR9K NP, PRM, and DRV fixes.
- A **platform-independent** fix, such as Cisco bug ID CSCud08809
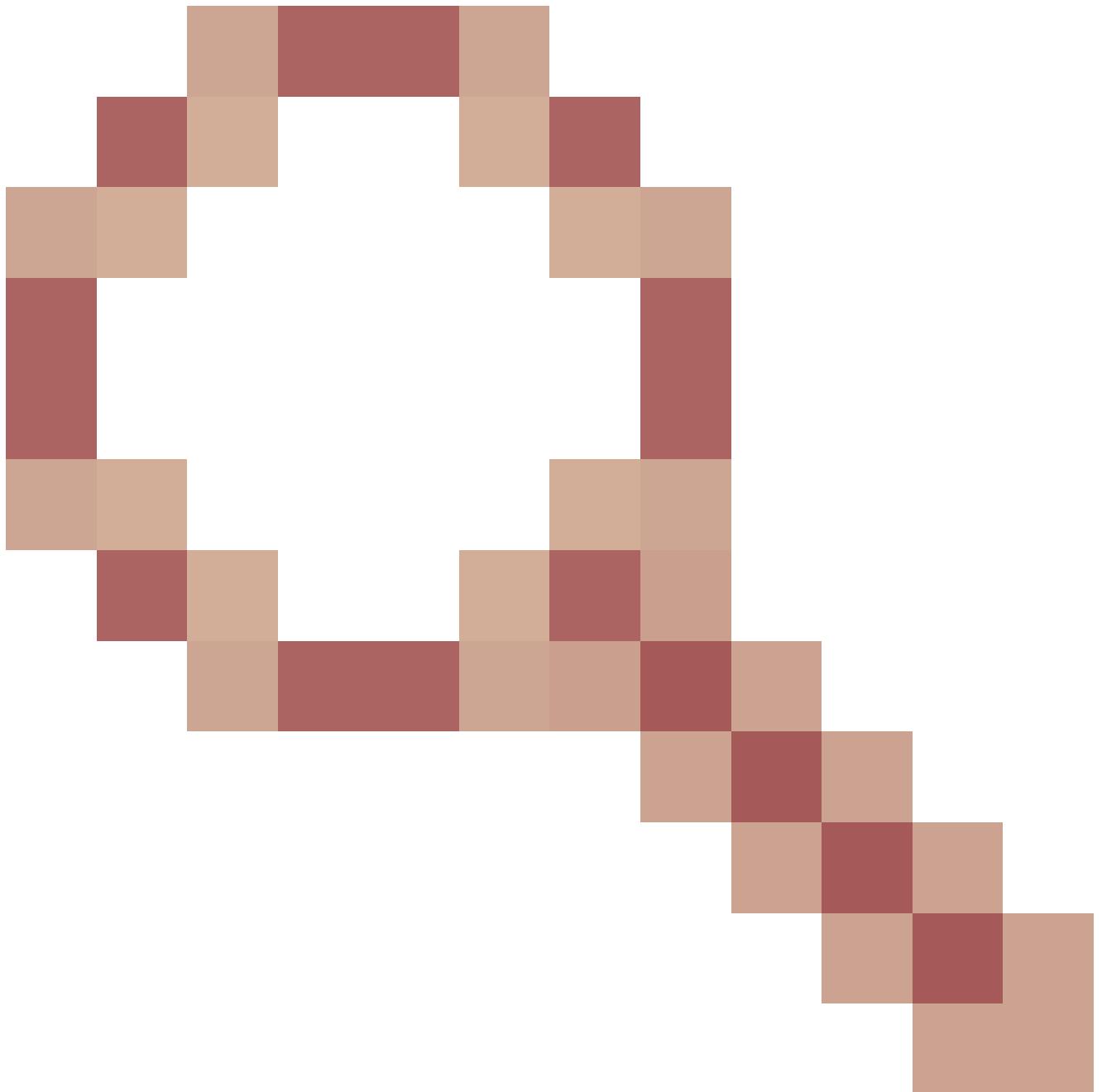
Cisco bug ID [CSCud08809](https://tools.cisco.com/bugsearch/bug/CSCud08809)
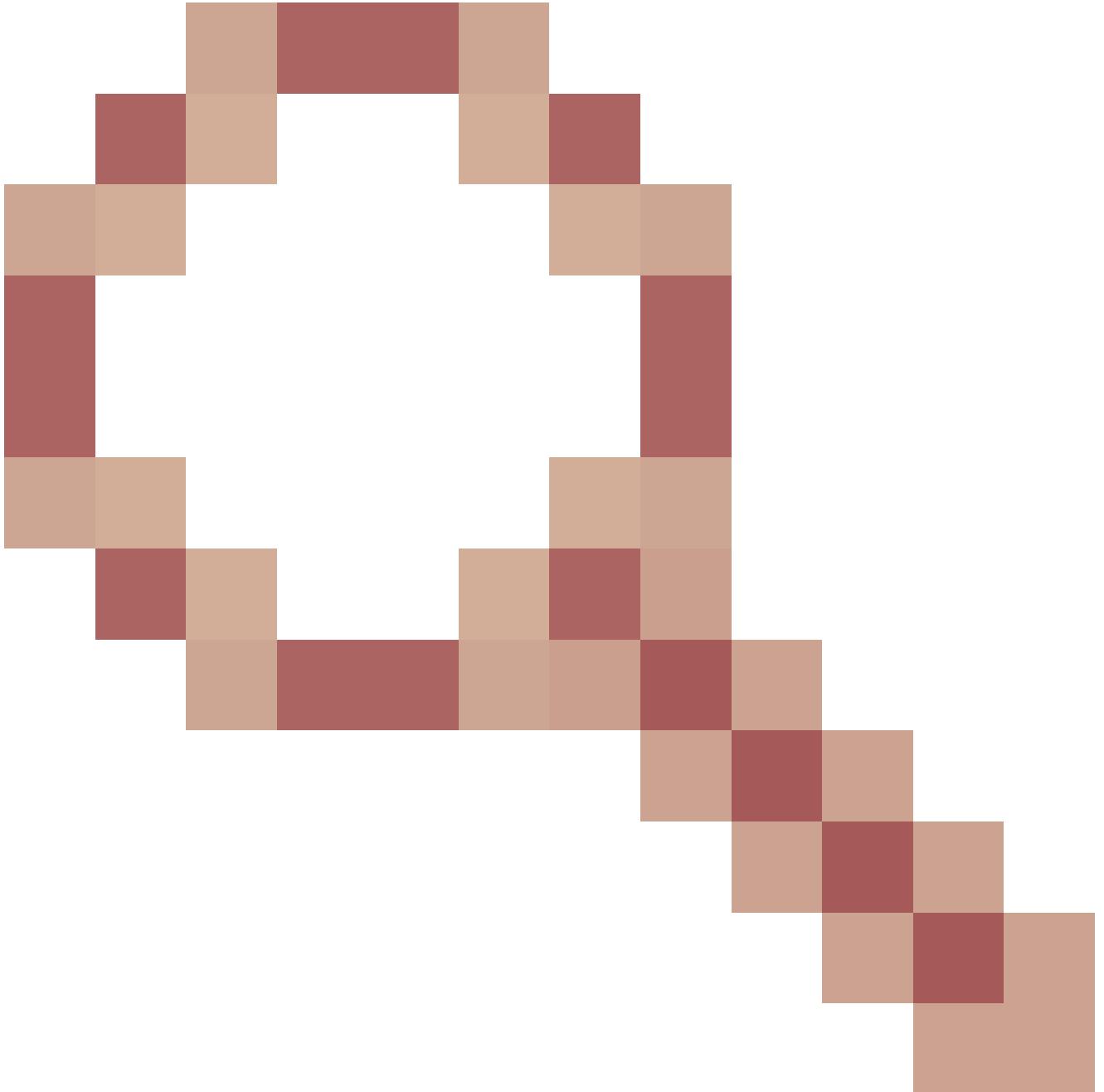
" />Traffic Loss, BGP Umbrella DDTS #1, spreads across all XR platforms.

Umbrella SMUs are provided for platform-dependent fixes that are considered mission-critical. Umbrella SMUs are a collection of fixes that can be applied in order to maintain stability on any base software release.

Service Packs

A Service Pack (SP) is a special type of umbrella SMU that contains a roll-up of all the previously released SMUs. The SPs are designed so that they include all of the bug fixes in a single package in order to ease software maintenance.

✎ **Note**: Only one SP can be active on the router at a time.

Here are some important notes about SPs:

- SPs are only supported on Cisco IOS XR releases with no other SMUs present. This means that a mix of SMUs and SPs is not supported.

- SPs are released approximately every eight weeks.
- SPs are not available for all Cisco IOS XR releases.

In this example, there are three SPs that have been released for Cisco IOS XR Version 4.3.2:

- Cisco IOS XR 4.3.2 Service Pack 1 for ASR9K-PX platform (asr9k-px-4.3.2.sp-1.0.0.pie)
- Cisco IOS XR 4.3.2 Service Pack 2 for ASR9K-PX platform (asr9k-px-4.3.2.sp2.pie)
- Cisco IOS XR 4.3.2 Service Pack 3 for ASR9K-PX platform (asr9k-px-4.3.2.sp3.pie)

In order to install the latest SP, you must add, install, and commit the latest SP. In this example, SP2 is added to a router that already runs SP1. The presence of SP1 is not required before SP2 works.

In order to verify if an SP currently runs on your system, enter the **show install active summary** command:

```
<#root>

RP/0/RSP0/CPU0:router(admin)#

show install active summary


Default Profile:
  SDRs:
    Owner
  Active Packages:
    disk0:asr9k-mini-px-4.3.2
    disk0:asr9k-mgbl-px-4.3.2
    disk0:asr9k-fpd-px-4.3.2
    disk0:asr9k-k9sec-px-4.3.2
    disk0:asr9k-mpls-px-4.3.2
    disk0:asr9k-mcast-px-4.3.2


disk0:asr9k-px-4.3.2.sp1-1.0.0
```

As shown, SP1 is already active. Now you can add SP2 via File Transfer Protocol (FTP):

```
<#root>

RP/0/RSP0/CPU0:router(admin)#

install add ftp://root:root@10.0.0.1/
 asr9k-px-4.3.2.sp2.pie


Install operation 41 '(admin) install add /ftp://root:***@10.0.0.1/
 asr9k-px-4.3.2.sp2.pie' started by user
'root' via CLI at 14:01:14 MST Wed Jun 11 2014.
The install operation will continue asynchronously.

RP/0/RSP0/CPU0:router(admin)#Info: The following package is now available
 to be activated:
Info:
Info:          disk0:asr9k-px-4.3.2.sp2-1.0.0
Info:
Info:     The package can be activated across the entire router.
Info:
Install operation 41 completed successfully at 14:05:03 MST Wed Jun 11 2014.
```

Then, you can activate the SP:

✎ **Note**: The SP activation requires a system reload.

```
<#root>

RP/0/RSP0/CPU0:router(admin)#
```

install activate disk0:asr9k-px-4.3.2.sp2-1.0.0

```
Install operation 44 '(admin) install activate disk0:asr9k-px-4.3.2.sp2-1.0.0'
 started by user 'root' via
CLI at 14:15:47 MST Wed Jun 11 2014.
Info:
Info:      This operation will reload the following nodes in parallel:
Info:          0/RSP0/CPU0 (RP) (SDR: Owner)
Info:          0/RSP1/CPU0 (RP) (SDR: Owner)
Proceed with this install operation (y/n)? [y]
Info:      Install Method: Parallel Reload
The install operation will continue asynchronously.
```

Once the router comes back online, commit the SP so that the software survives a reload:

```
<#root>

RP/0/RSP0/CPU0:router(admin)#
```

install commit

```
Wed Jun 11 14:48:45.887 MST
Install operation 42 '(admin) install commit' started by user 'root' via CLI
 at 14:48:45 MST Wed Jun 11 2014.
Install operation 42 completed successfully at 14:48:48 MST Wed Jun 11 2014.
```

You can deactivate and remove the old SP:

```
<#root>

RP/0/RSP0/CPU0:router(admin)#
```

install deactivate disk0:asr9k-px-4.3.2.sp-1.0.0

```
Install operation 43 '(admin) install deactivate disk0:asr9k-px-4.3.2.sp-1.0.0'
 started by user 'root' via CLI at 14:27:39 MST Wed Jun 11 2014.
Info:      Install Method: Parallel Process Restart
The install operation will continue asynchronously.

RP/0/RSP0/CPU0:router(admin)#Info:The changes made to software configurations
 will not be persistent across system reloads. Use the
Info:      command '(admin) install commit' to make changes persistent.
```

```
Info:      Please verify that the system is consistent following the software
 change using the following
Info:      commands:
Info:          show system verify
Info:          install verify packages
Install operation 43 completed successfully at 14:28:39 MST Wed Jun 11 2014.

RP/0/RSP0/CPU0:router(admin)#
```

install remove disk0:asr9k-px-4.3.2.sp-1.0.0

```
Wed Jun 11 14:48:57.599 MST
Install operation 49 '(admin) install remove disk0:asr9k-px-4.3.2.sp-1.0.0'
 started by user 'root' via CLI at 14:48:57 MST Wed Jun 11 2014.
Info:      This operation will remove the following package:
Info:          disk0:asr9k-px-4.3.2.sp-1.0.0
Info:      After this install remove the following install rollback points will
 no longer be reachable, as the
Info:      required packages will not be present:
Info:          42, 44
Proceed with removing these packages? [confirm]
The install operation will continue asynchronously.

RP/0/RSP0/CPU0:router(admin)#Install operation 49 completed successfully at
 14:49:16 MST Wed Jun 11 2014.
```

Commit the software again in order to save the changes:

<#root>

```
RP/0/RSP0/CPU0:router(admin)#
```

install commit

```
Install operation 50 '(admin) install commit' started by user 'root' via CLI at
 14:55:51 MST Wed Jun 11 2014.
Install operation 50 completed successfully at 14:55:53 MST Wed Jun 11 2014.
```

The new SP is now installed:

<#root>

```
RP/0/RSP0/CPU0:router(admin)#
```

show install active summary

```
Default Profile:
  SDRs:
    Owner
  Active Packages:
    disk0:asr9k-mini-px-4.3.2
    disk0:asr9k-mgbl-px-4.3.2
    disk0:asr9k-fpd-px-4.3.2
    disk0:asr9k-k9sec-px-4.3.2
    disk0:asr9k-mpls-px-4.3.2
```

```
disk0:asr9k-mcast-px-4.3.2
```

disk0:asr9k-px-4.3.2.sp2-1.0.0

SMU Naming Convention

A SMU consists of the SMU binary file and its associated Readme text file, which contains any associated caveats. Examples include:
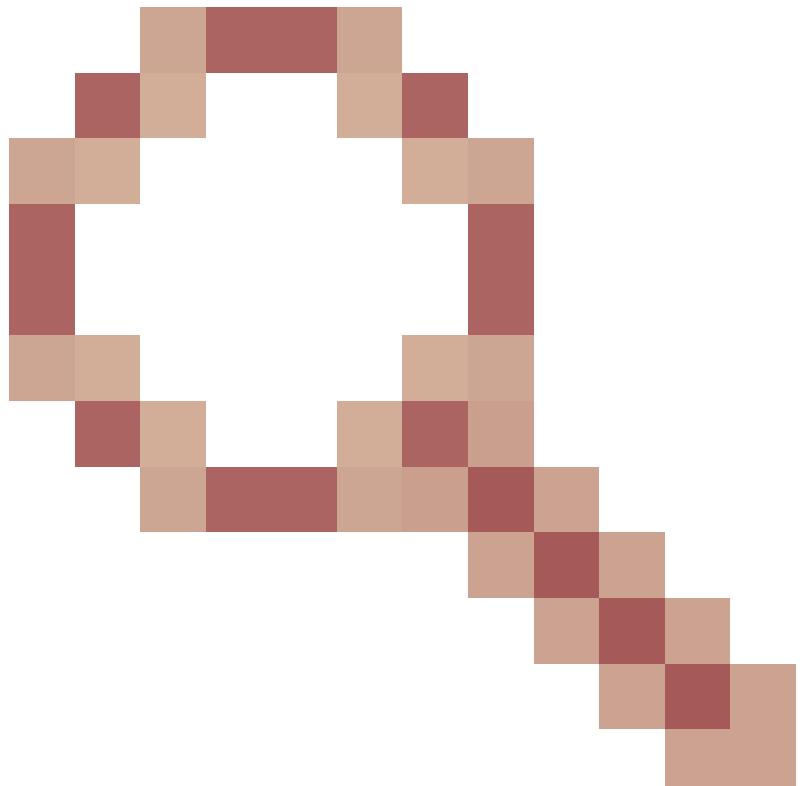
- hfr-px-4.2.3. Cisco bug ID [CSCue43799](#) .pie
- hfr-px-4.2.3. Cisco bug ID [CSCue43799](#)
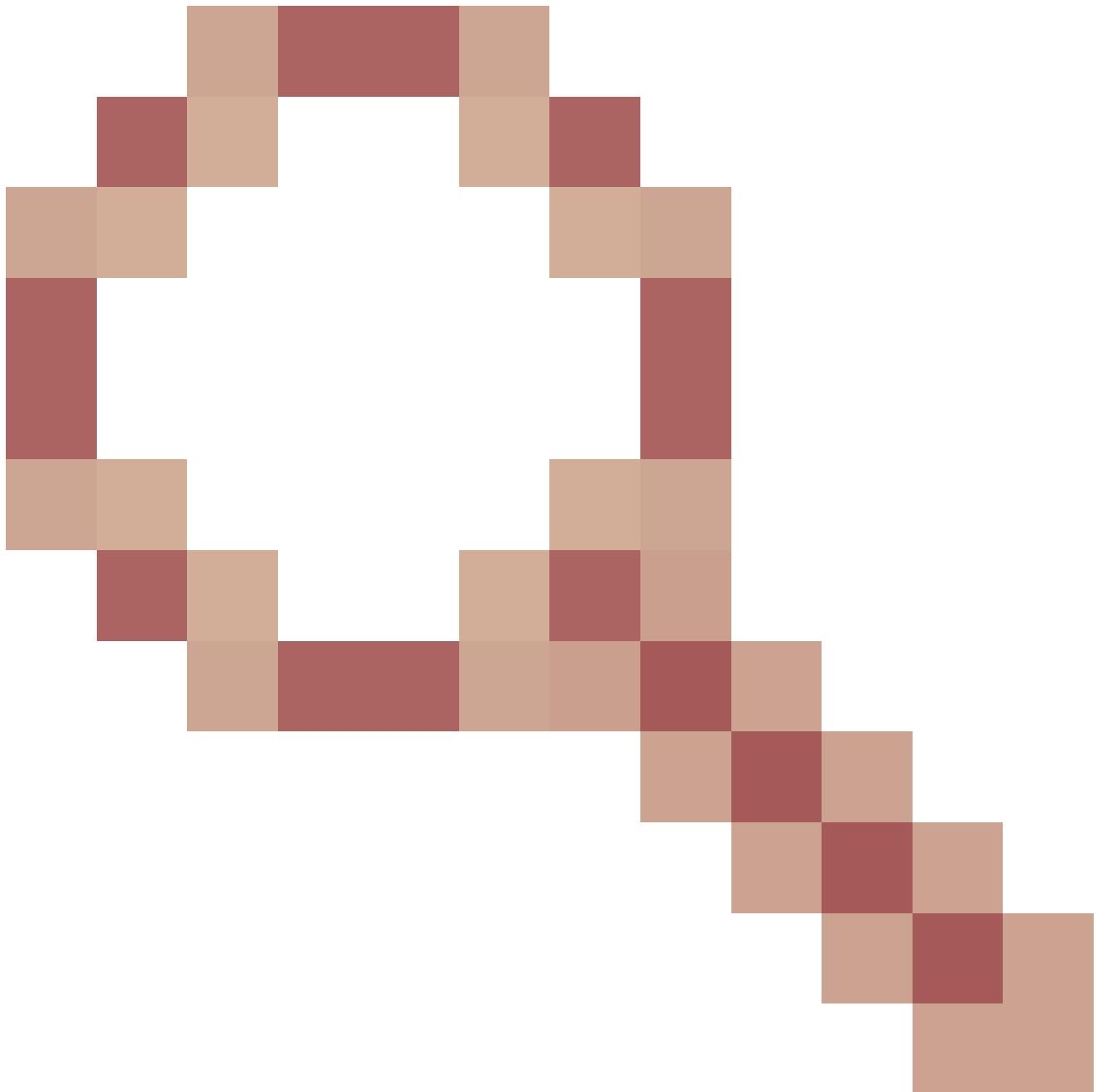
.txt
- hfr-p-4.2.3. Cisco bug ID [CSCue43799](#)
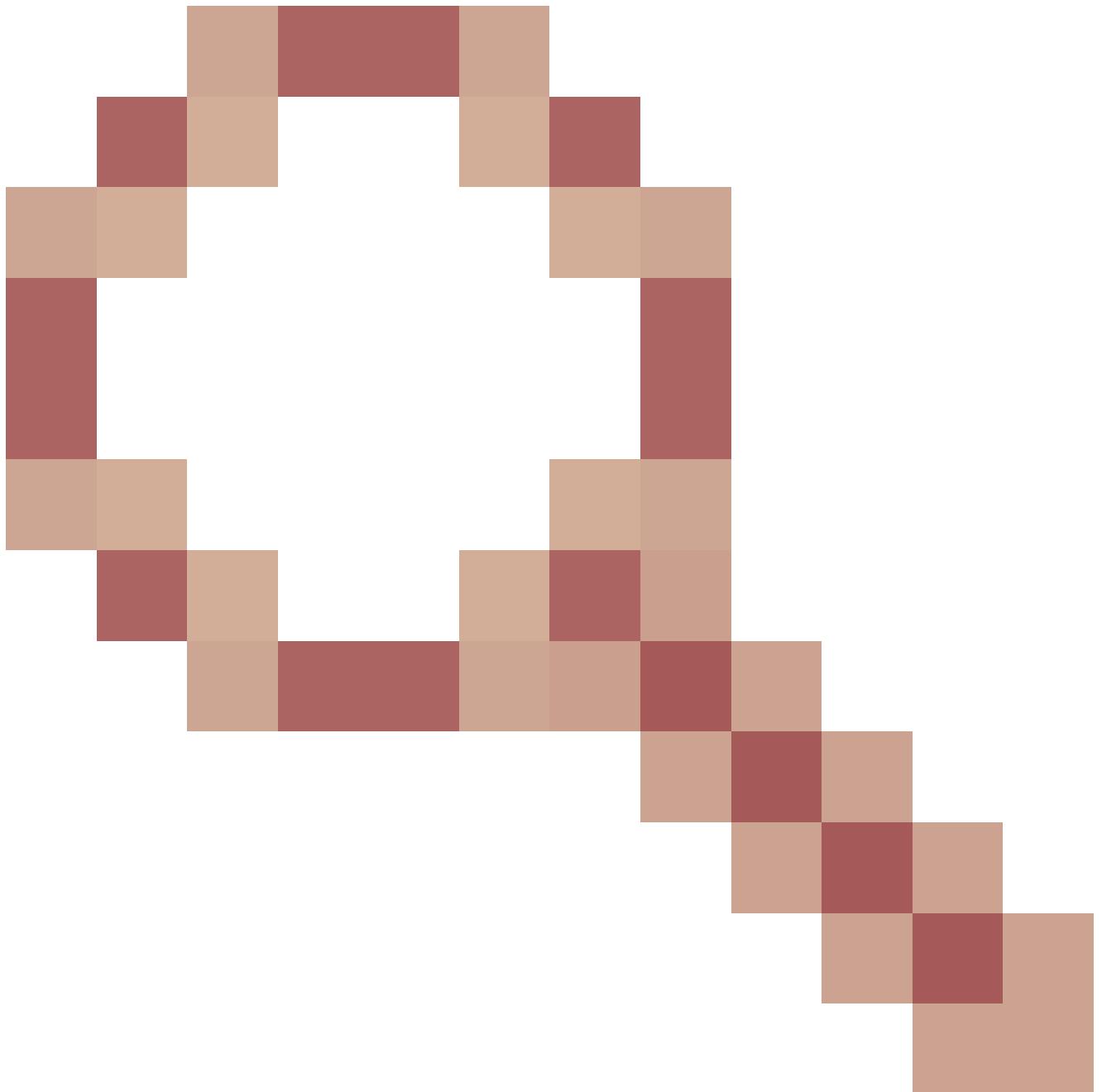
.pie
- hfr-p-4.2.3. Cisco bug ID [CSCue43799](#)
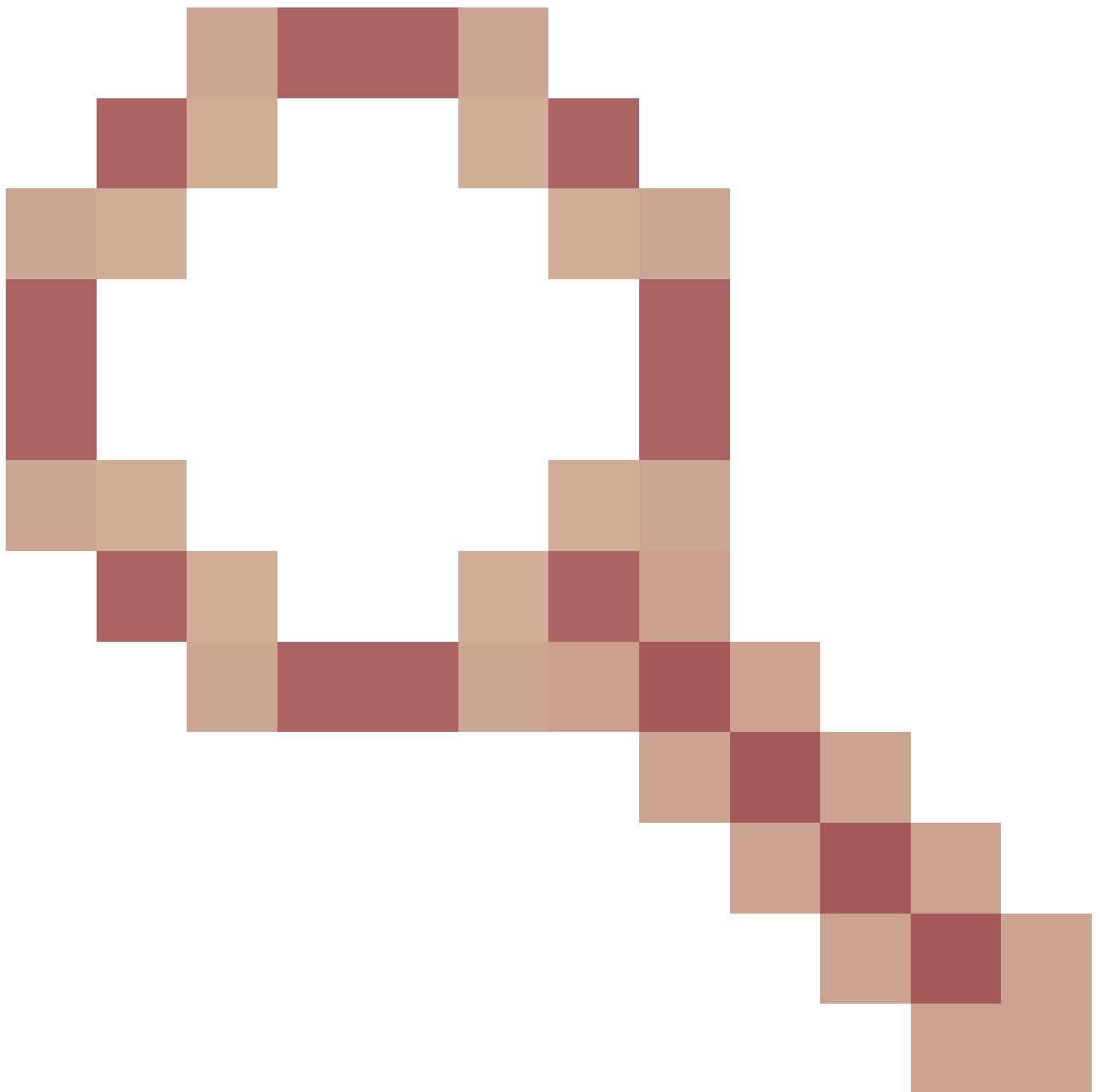
.txt
- asr9k-px-4.3.0. Cisco bug ID [CSCue35562](#)
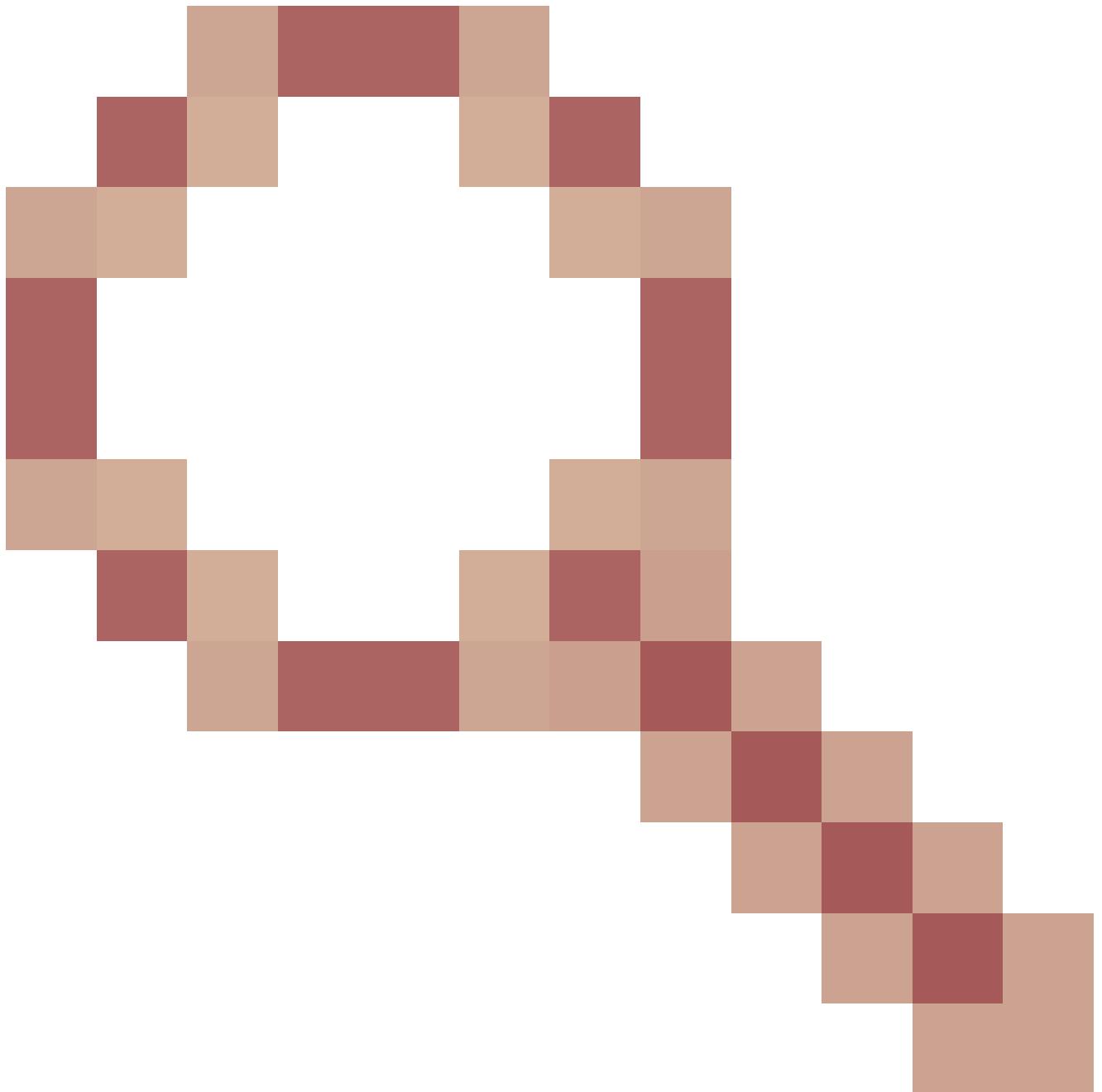
.pie
- asr9k-px-4.3.0. Cisco bug ID CSCue35562
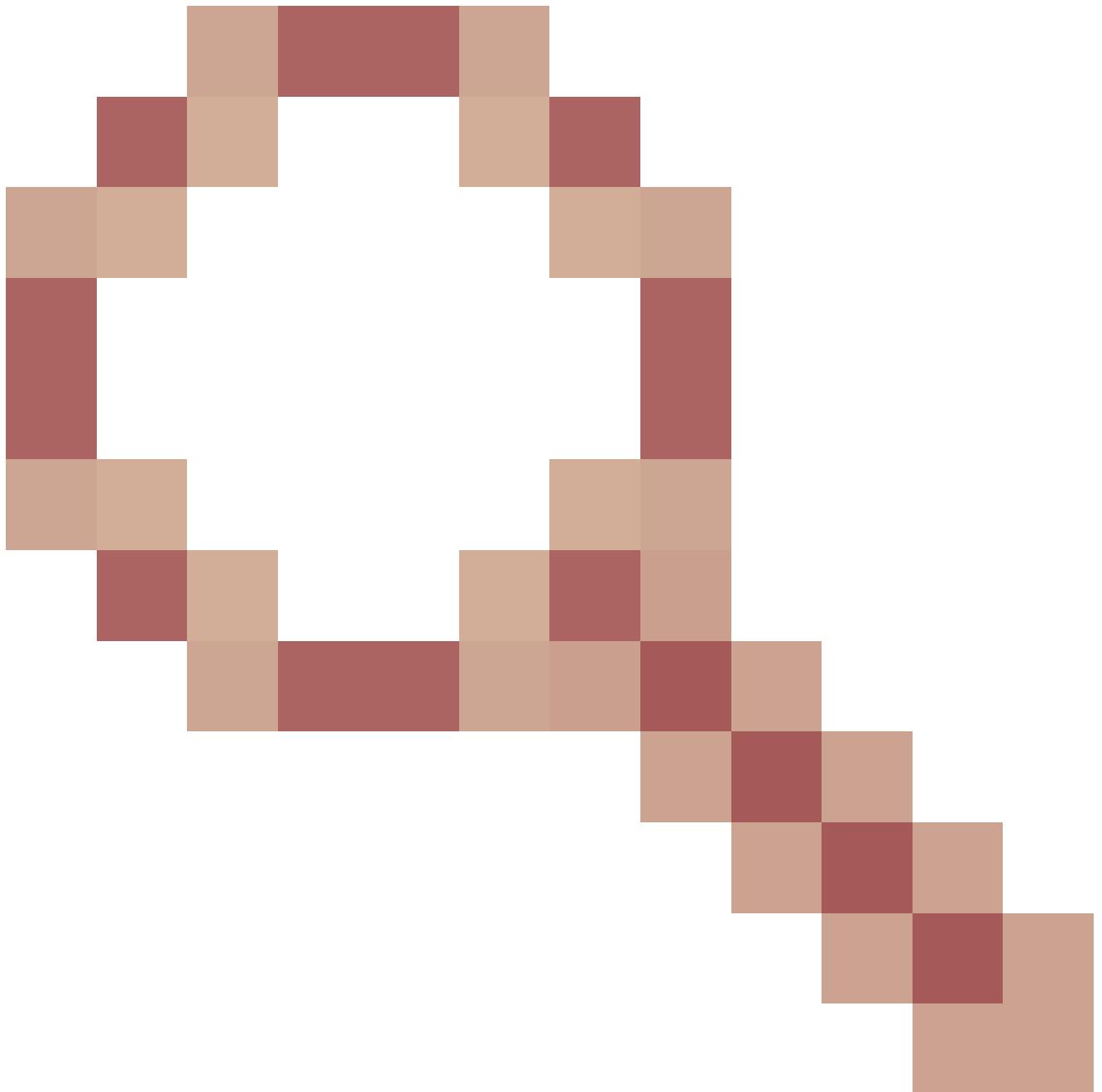
.txt
- asr9k-p-4.2.0. Cisco bug ID [CSCus50217](#)
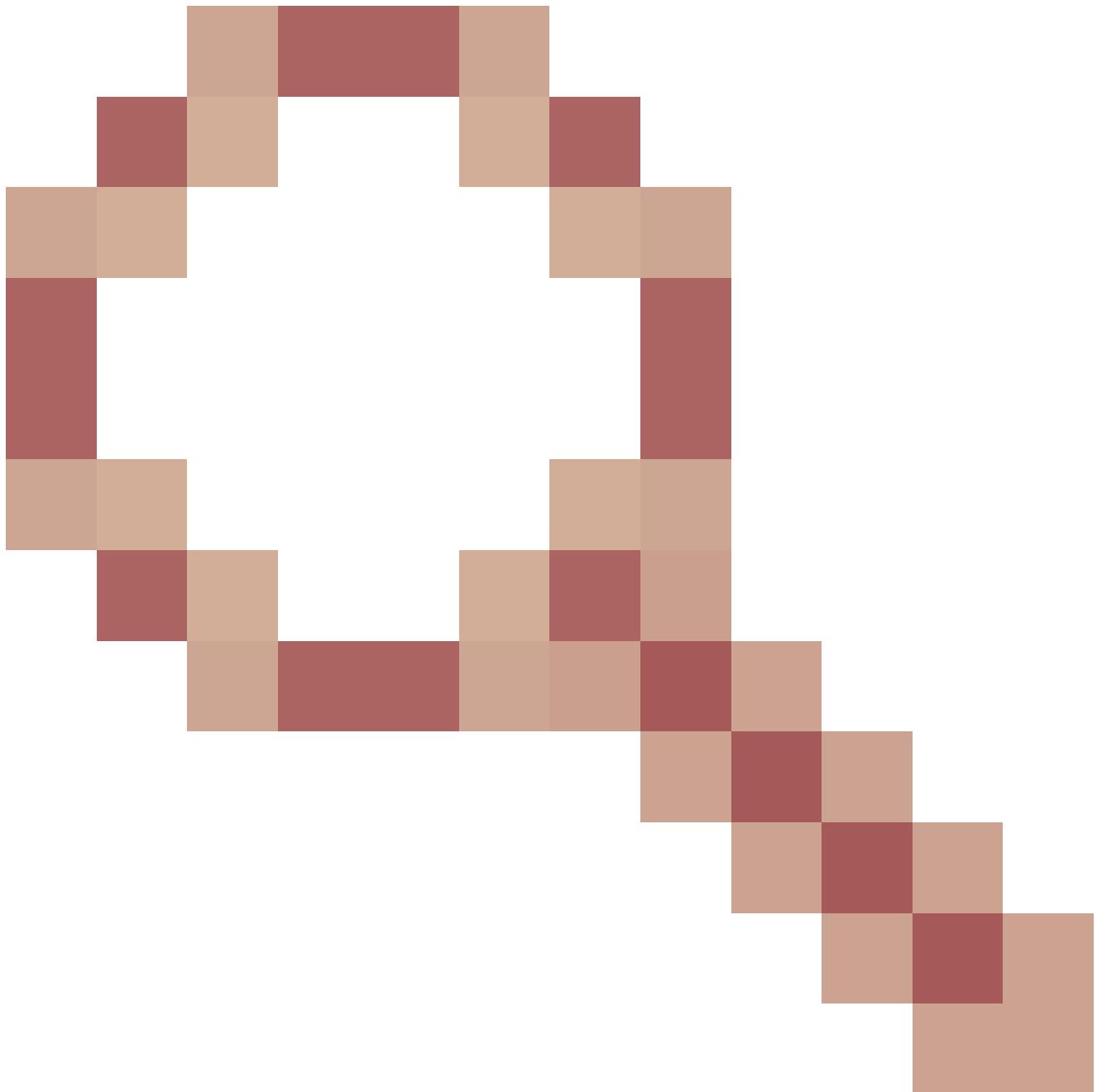
.pie
- asr9k-p-4.2.0. Cisco bug ID [CSCus50217](#)
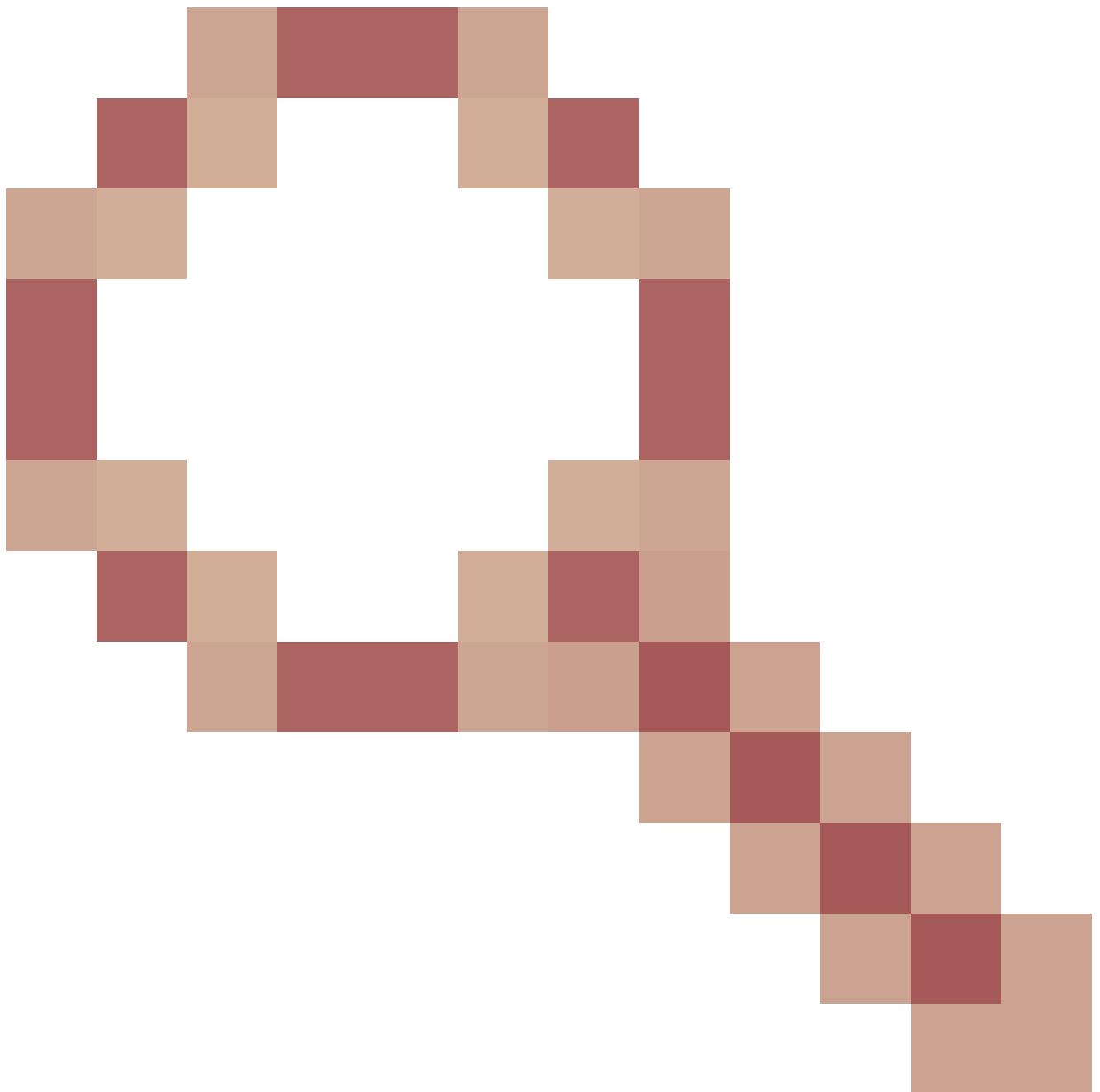
.txt
- asr9k-px-4.2.0. Cisco bug ID [CSCus50217](#)
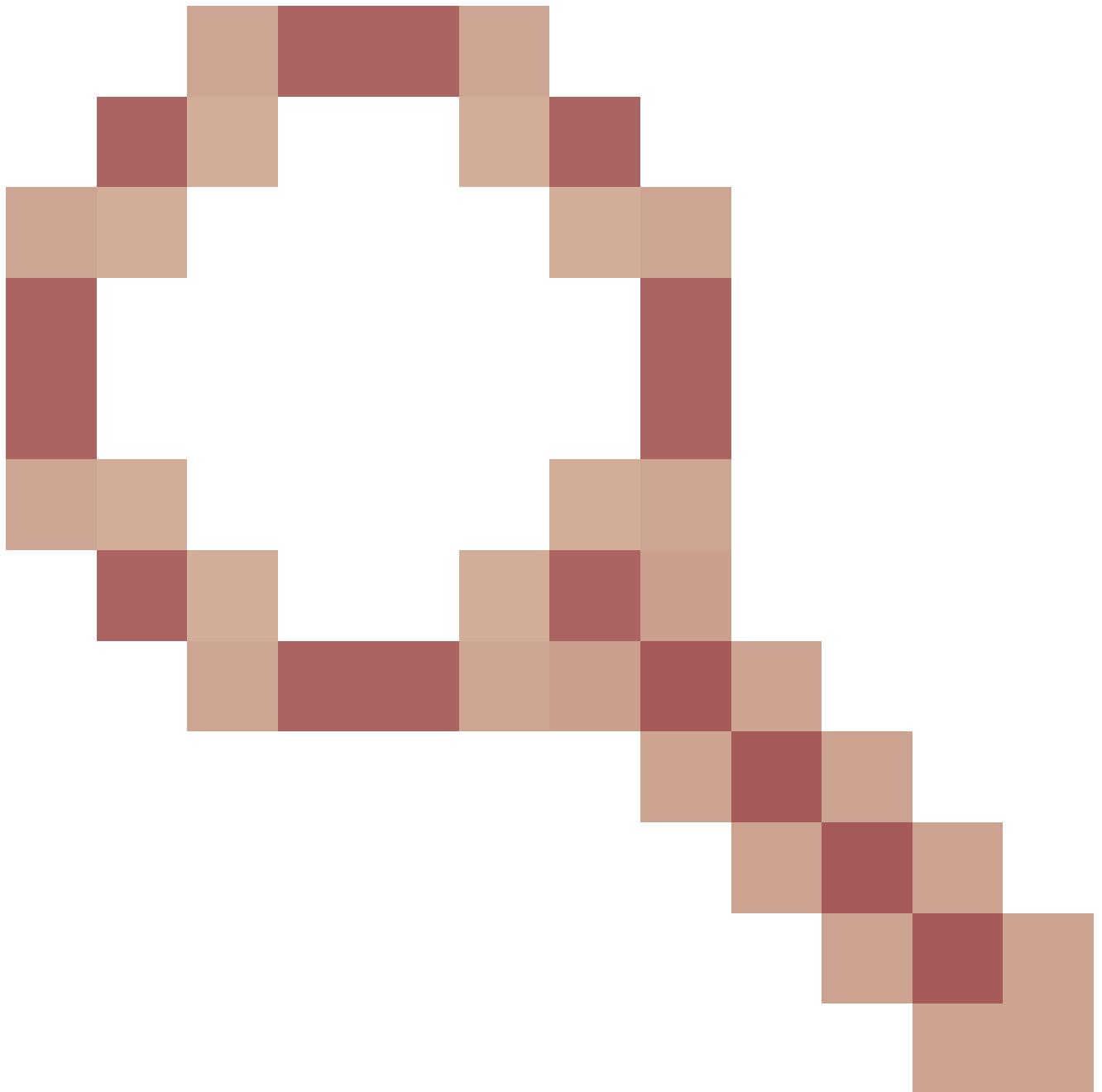
.pie
- asr9k-px-4.2.0. Cisco bug ID [CSCus50217](#)
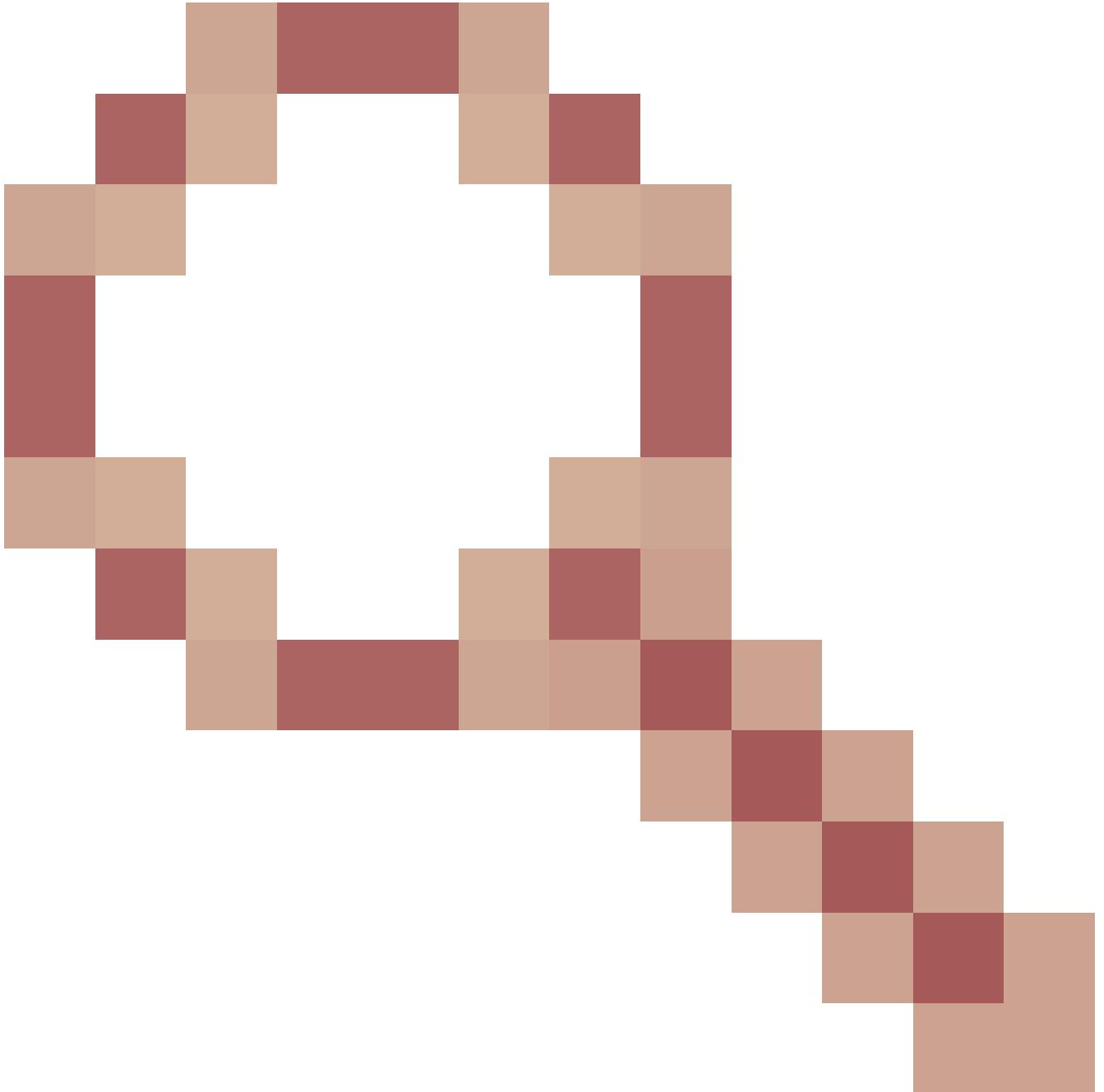
.txt

The naming convention uses the format platform-type-release-DDTS ID-file format.

- Platform:
    - hfr (CRS)
    - c12k (12000)
    - asr9k (ASR 9000)
    - ncs6k (NCS 6000)
    - ncs5k (NCS 5000)
    - ncs5500 (NCS 5500)
    - xrv9k (XRv9000)
- Image type:
    - p
    - px
- Release: 4.3.0, for example
- DDTS ID: Cisco bug ID [CSCxx12345](#)
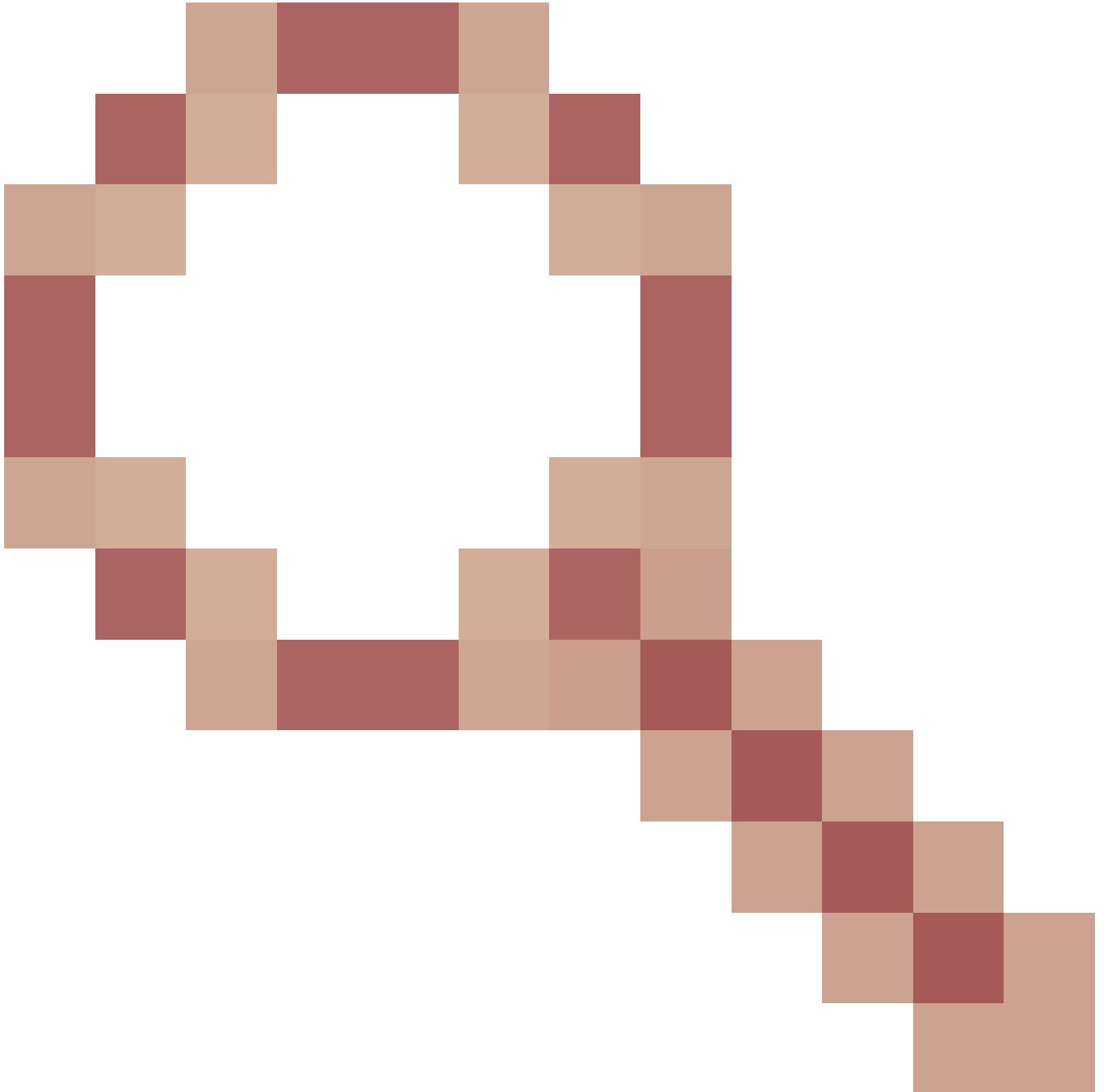
, for example

- File format:
  - .pie
  - .txt
  - .tar

Note that:

- There are no PX PIE/SMU image types in Cisco IOS XR software releases earlier than 4.0.
- SMUs earlier than Release 4.0 do not include the image type; instead, the SMUs include the package that the SMU affects.
- With Cisco IOS XR software Release 4.3.0 and later, the PX PIE image type is the only option on ASR9000 and CRS platforms. P images are no longer supported. The P images are now converged with PX. Through the normal upgrade process, the migration happens to PX.
- Composite SMUs earlier than Cisco IOS XR Release 4.0.0 are named comp-*. Example: comp-hfr-3.9.3. Cisco bug ID CSCtq84280
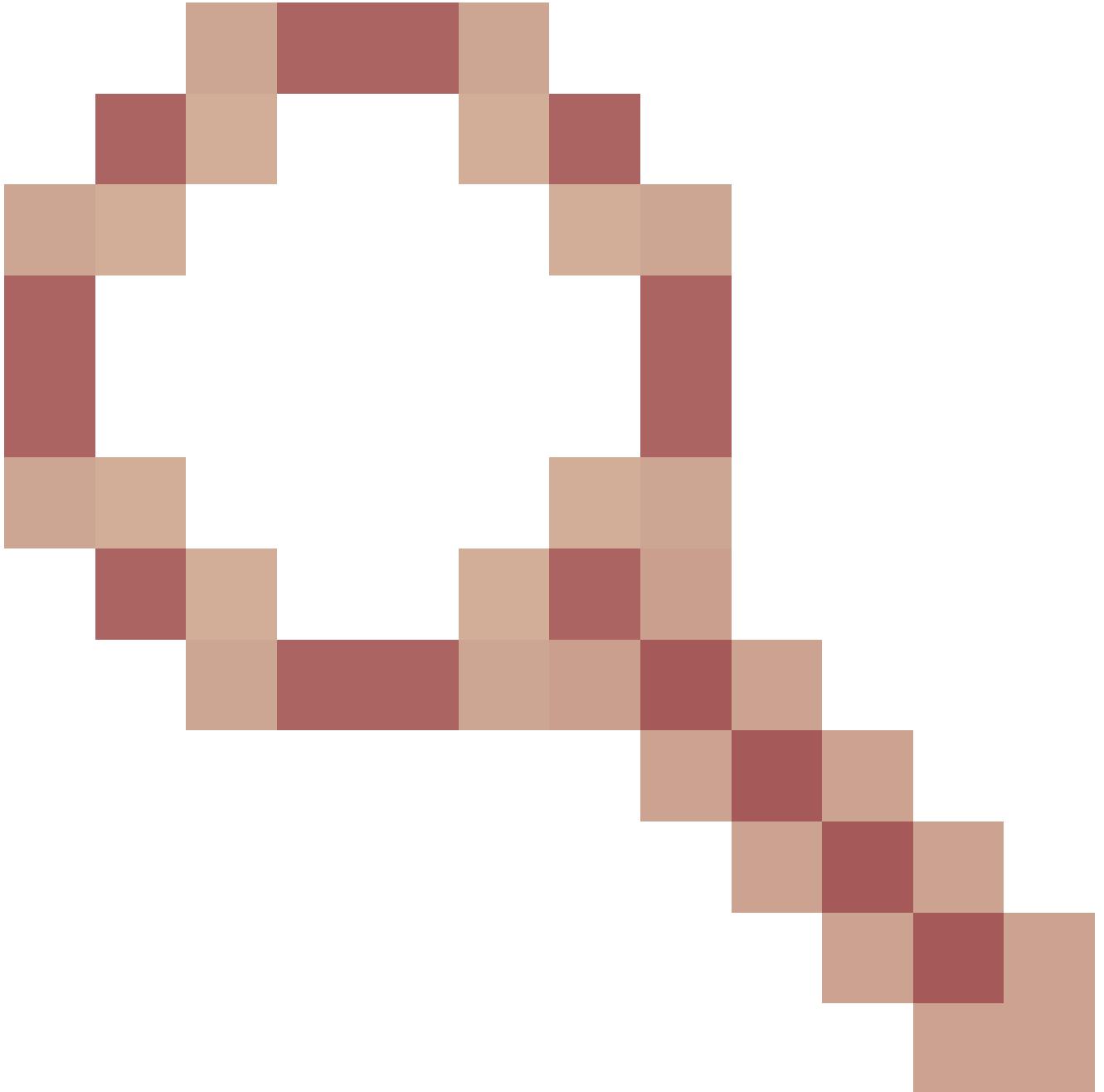
Download SMUs from Cisco.com

SMUs are located in two key repositories: the Download Software center and the File Exchange.

Download Software Center

SMUs can be downloaded from the Cisco [Download Software Center](#).

1. In the Download Software Center, navigate to the router platform type. In this example, navigate to **Downloads Home > Products > Routers > Service Provider Edge Routers > Cisco ASR 9000 Series Aggregation Services Routers > Cisco ASR 9006 Router**.
2. Select **IOS XR Software Maintenance Upgrades (SMU)** or **IOS XR Software Maintenance Upgrades (SMU) Bundles** as shown in the image.

3. If you selected **IOS XR Software Maintenance Upgrades (SMU)**, select the release that corresponds to the Cisco IOS XR version in the SMU section, and download any mandatory, recommended, or optional SMUs.
4. The SMU section includes individual mandatory, recommended, and optional SMUs that are packaged as tar files. The tar file of an individual SMU includes the SMU and the Readme file.
5. The tar file can either be installed as it uses a special tar option, or you can uncompress the tar file and install the individual SMU.

6. If you selected **IOS XR Software Maintenance Upgrades (SMU) Bundles**, the SMU Bundles Section provides tarball files that include all the recommended and mandatory SMUs for a specific release and platform. Each tarball includes all the recommended SMUs and their Readme files. SMU tarballs have a release date and are updated periodically with the addition of other recommended and mandatory SMUs.
7. The recommended SMU tarball can be installed as it is uses a special tar option, or you can uncompress the tar file and install each individual SMU.

File Exchange

SMUs can be downloaded from the Cisco File Exchange.

Optional SMUs were not posted in the Download Software Center earlier than Cisco IOS XR software Release 4.2.3. So, those optional SMUs needed to be downloaded from the File Exchange or posted with special access by a TAC engineer.

SMUs on the File Exchange require special permission, and you must request access in order to download a specific SMU. Email iosxr-file-exchange@cisco.com in order to request access; include your name, company, and issue in the subject line, and include problem details in the message body.

Optional SMUs for the latest software releases are now available in the Download Software Center. Access to the File Exchange is not needed for most SMUs.

SMU Readme File

Each SMU tar file contains a SMU (.pie) and the Readme file. Cisco recommends you review the associated Readme file before you install a SMU.

The Readme file provides this information:

- Console and error messages during SMU activation or deactivation
- SMU installation impact
- Side effects and possible workarounds
- SMU caveats
- Package(s) that the SMU impacts
- Prerequisites
- Supercedes
- Restart type

- On-the-box name of the SMU
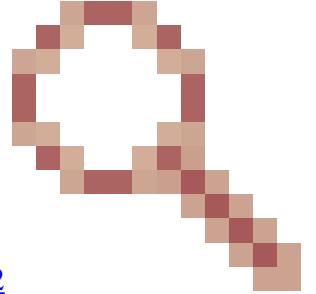
Here is an example of the Readme file for asr9k-px-4.2.3. Cisco bug ID CSCud29892
.pie.

```
# Last Modified Date: 12/05/12-16:39:33
############################################################################
#
# Readme for SMU pie asr9k-px-4.2.3.CSCud29892                                  .pie
#
# Copyright (c) 2012 by Cisco Systems, Inc.
# All rights reserved.
#
############################################################################

Date Generated:         Tue Nov 27 12:43:29 PST 2012

Owner:                  bhuie

Name:                   asr9k-px-4.2.3.CSCud29892
```

.pie
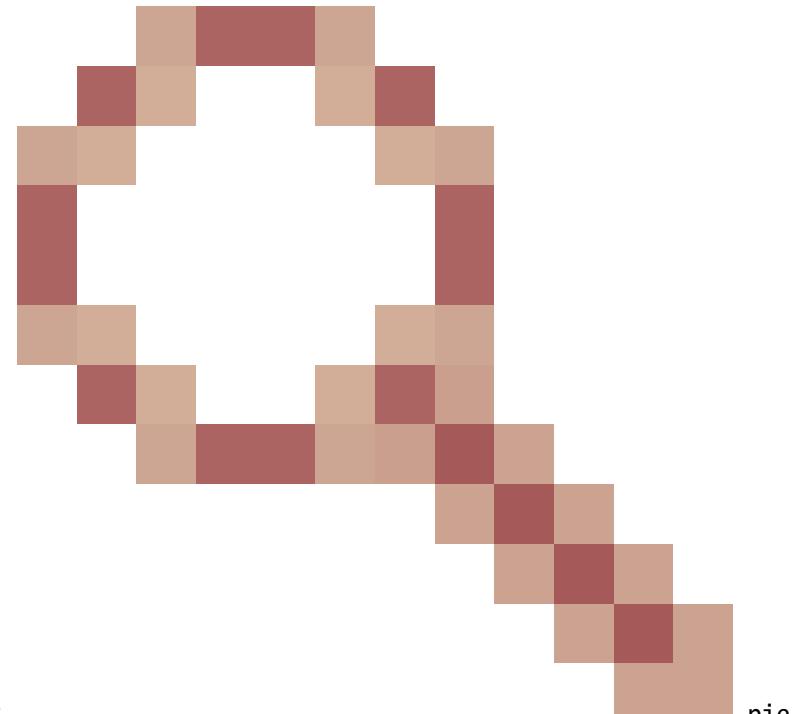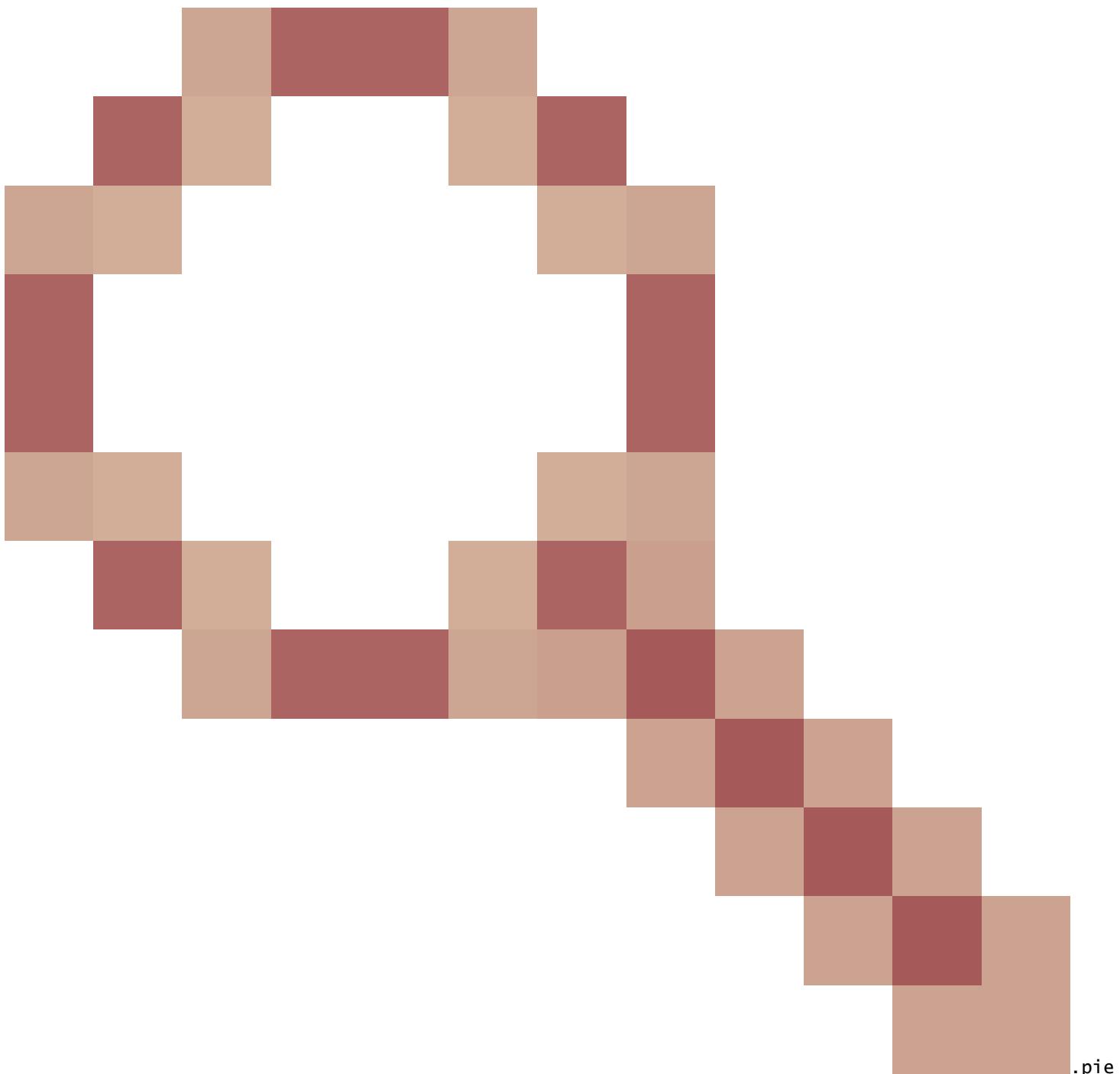
Package(s):   asr9k-fwding-4.2.3.CSCud29892
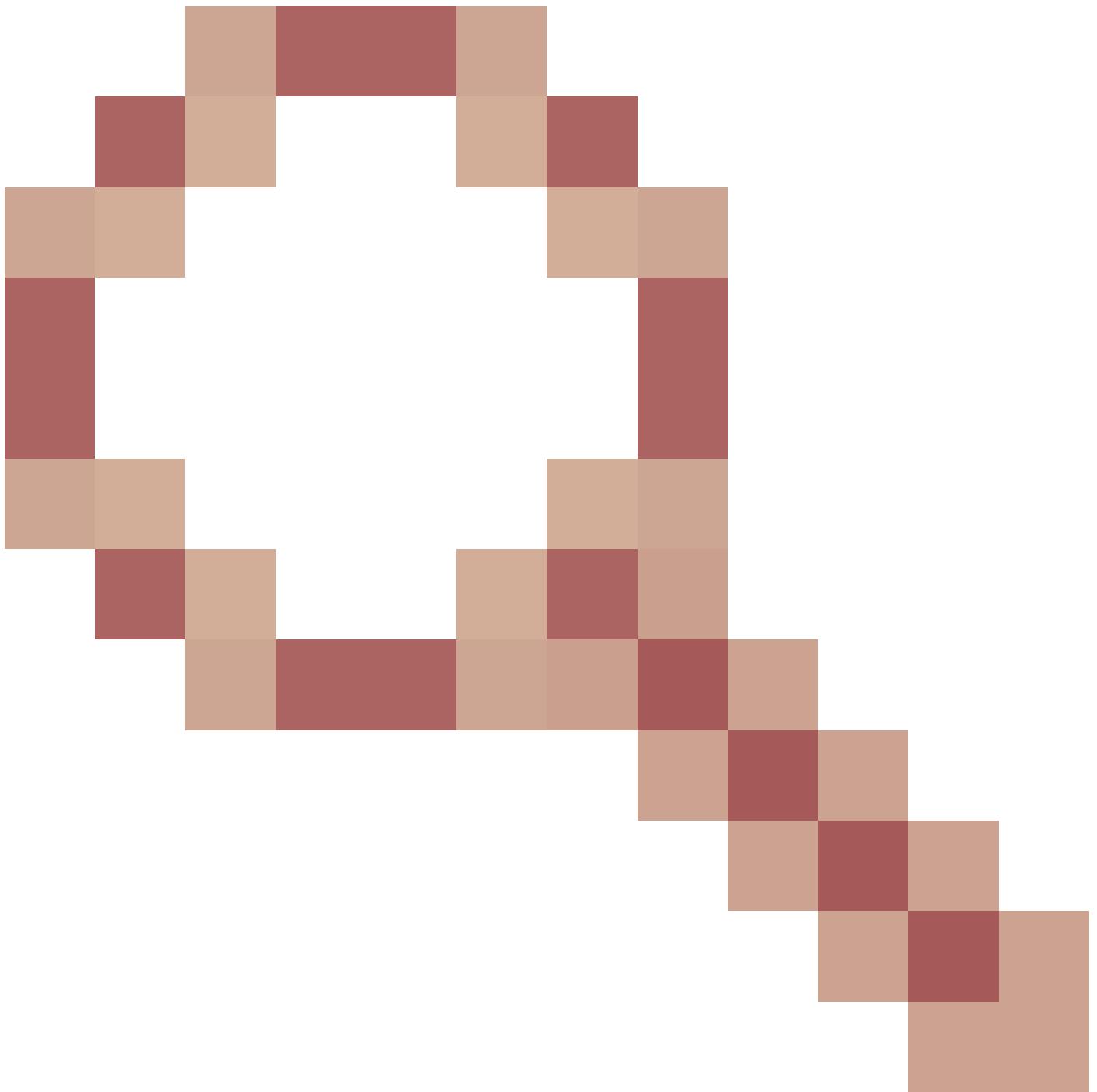
On-the-Box Name: asr9k-px-4.2.3.CSCud29892-1.0.0

Compressed File Size: 265974 bytes

Uncompressed File Size: 629867 bytes

DDTS: CSCud29892
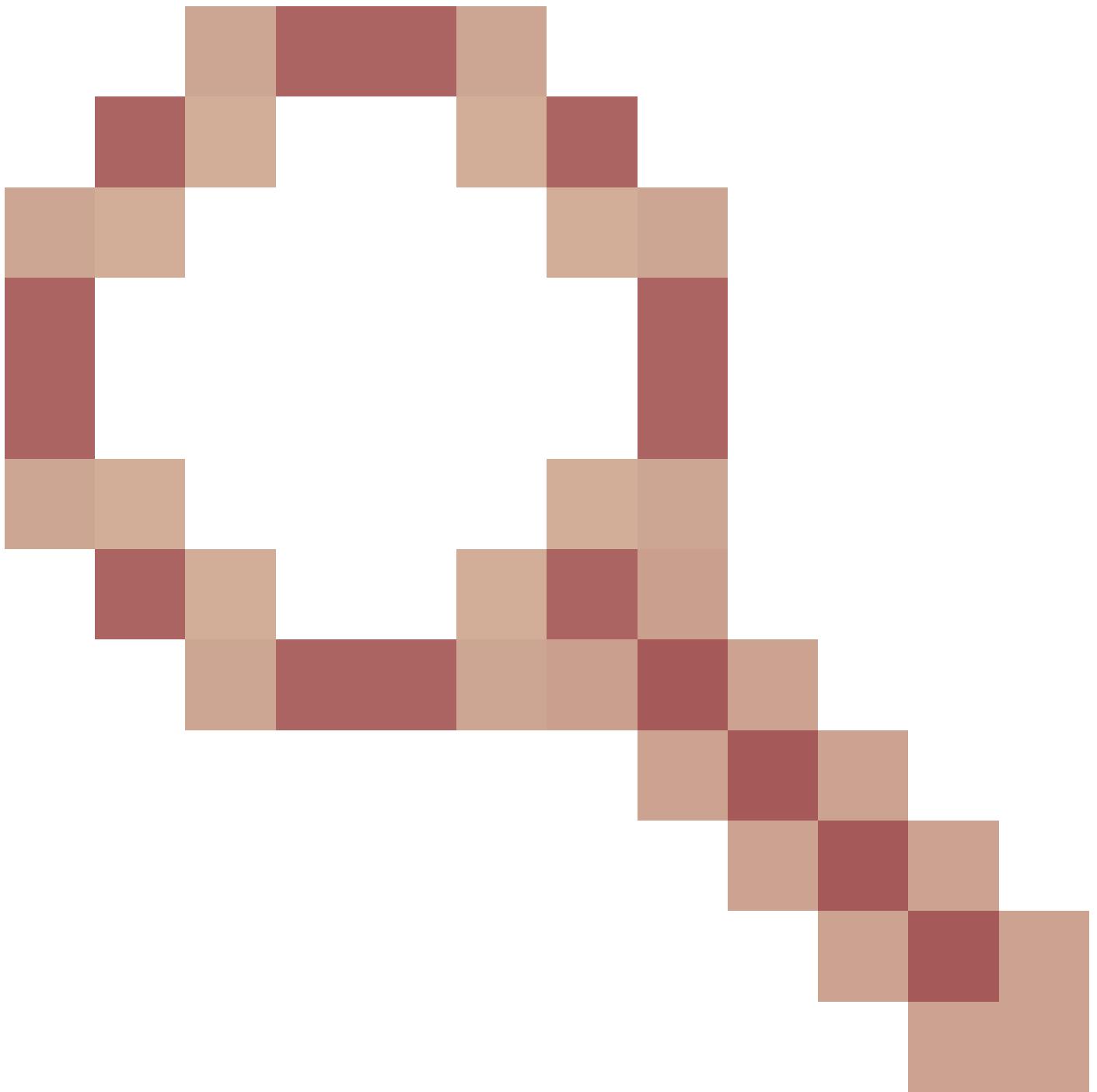
Description: bundle replay not processed for a subset of interfaces

Pre-requisites:

Supercedes:

Incompatibility:

Restart Type: dependent

Cards:

MD5:   98e87dc36997e10c9aea5e9e08ba5d13

****
CONSTITUENT SMU DETAILS:
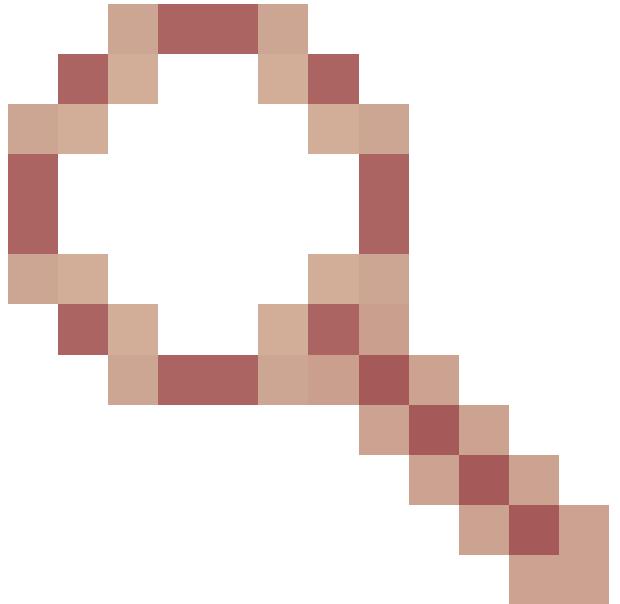
```
Name:                   asr9k-fwding-4.2.3.CSCud29892
Pre-requisites:
Incompatibility:
Restart Type:           dependent
Cards:
MD5:                    98e87dc36997e10c9aea5e9e08ba5d13
SMU Pie Contents:
       platforms/viking/features/ether_infra@r42x/3

CSS Certificate:
    Version: 3
    Serial Number: 61:0C:03:CE:00:00:00:00:00:11:
    Issuing Algorithm: MD5withRSA
    Issued By: CN = Code Signing Server Certificate Authority, O = Cisco, C = US
    Not Before: Dec 05, 2007 00:43:56 GMT
    Not After: Oct 17, 2015 01:51:47 GMT
    Subject Name: CN = Release code sign certificate


SMU Pie Contents:
    platforms/viking/features/ether_infra@r42x/4

SMU Install Questions:
----------------------
1- Console/error messages during SMU activation/deactivation? Please specify
   the safe messages to ignore

None

2- Is SMU activation/deactivation traffic impacting?

No

3- Are there any side effects to this SMU that require workaround? (for example
   AAA SMU requiring exit out of current session and reconnecting after install).
   If so what?

None


SMU Caveats:

None
```

SMU Criteria and Policy

SMU requests are evaluated on a case-by-case basis. Directors or approved designates have the approval authority. The decision is based on the business justification, user impact, and the engineering feasibility of a point fix.

Official Production SMU Characteristics

Characteristics of an official production SMU are:

- It is not an alternative to a maintenance release.
- It is specific to package versions and is meant for all users.
- The bug fix is not user-specific in nature.
- It is fully supported by TAC.
- New fixes are integrated into subsequent maintenance releases.
- There have been specialized testing for collateral damage, but the scope is limited compared to maintenance releases.

SMU Evaluation Criteria

A new production SMU request can be accepted based on these criteria:

- It addresses a critical problem that causes user outages.
- It addresses a critical problem that impacts live network deployment.
- It is a mandatory SMU, recommended by PSIRT or Cisco.
- There is no viable operational workaround for the user.
- The schedule for maintenance release is not feasible for the particular user.
- It addresses an issue that impacts revenue, such as billing or monitoring (counters, network management).

SMU Requests and Approval

SMUs that are not proactively created by the Business Unit must be formally requested by a network administrator.

A TAC Service Request must be open with a bug ID in resolved state.

TAC, Advanced Services, and Business Unit Deployment Engineers can request SMUs. This information is required when an SMU is requested:

- Bug ID (DDTS)
- Platform (ASR9K-P, ASR9K-PX, CRS-1, CRS-P, CRS-PX, XR12000)
- Release
- Requesting company
- Service request number
- Input details or justification
- Upgrade plans
- Other comments

If an SMU is accepted, the SMU team schedules the build and provides an estimated date for delivery. If an SMU is rejected, the reasons are documented, and the requester is informed about the decision.

SMU Rejection Scenarios

An SMU request for either an engineering or production SMU can not be accepted in some situations:

- The issue is cosmetic.
- A workaround exists that does not require a network redesign.
- The proposed solution is beyond the scope of a straightforward bug and is considered to be a feature.
- The solution is a command-line interface (CLI) change.
- The release or the package version for which the SMU is requested is no longer supported.
- The fix is integrated into a subsequent maintenance version within the same major/minor Cisco IOS XR release. An SMU can be provided as a proactive fix until the next maintenance release or a subsequent release can be qualified for deployment. This is done at the discretion of the Business Unit executive management.

SMU Delivery Timelines

Once Cisco TAC has officially confirmed that an SMU is to be provided, an SMU must go through these stages before it is released or posted:

- SMU requested (by, for example, a TAC engineer)
- SMU accepted after a management review; timelines set for delivery
- SMU assigned to a Development Engineer
- SMU Unit Testing conducted by Development Engineer
- SMU Dev Testing is conducted by the component testing group at the component level - for example, at the Border Gateway Protocol (BGP) or Open Shortest Path First (OSPF) protocol level
- SMU System Integration Testing conducted by the platform team, such as the ASR9K, CRS, or XR12000 team
- SMU released to Cisco.com or File Exchange

The timelines for SMU delivery typically range between six and eight weeks but can vary.

The majority of delays occur during system integration testing because the SMU is subject to the particular issue it fixes. The SMU is also tested in a multi-dimensional test scenario in order to ensure there are no collateral failures in other components.

SMU Supercedes and Prerequisites

Supercedes

An important concept to understand is that SMUs are committed to a software lineup particular to that release. If there are two SMUs in the same component that overlaps, there is no need to run them both at the same time.

This example illustrates the concept of a supercede.

SMU X fixes a Link State Advertisement (LSA) flooding issue in OSPF and contains the new OSPF process and libraries. SMU Y fixes a crash in the OSPF process. If Y was delivered after X, Y contains the fixes for both issue X and issue Y. SMU Y, while committed to the lineup, inherently takes the changes from X already. If you run Y, you do not need the SMU for X anymore. If you run the superceded SMU, you can remove it in order to save space; however, if both the SMUs are installed, that does not cause a problem.

Subsequently, if there is an SMU Z also in OSPF, then Z can not contain the changes from Y if the changes were not committed to the SMU lineup. So, when you load Z, it negates the changes applied by Y.

Partial Supercedes

A partial supercede SMU is one that includes some components of another SMU that overlap, but not all.

A partial supercede implies that some components from a previously posted SMU are not superceded by a new SMU. Partial superceded does not always mean there has to be a prerequisite dependency and depends on the code fix.

This example illustrates the concept of a partial supercede.

SMU X contains a change in OSPF and some library changes. SMU Y is another OSPF change as in the Supercedes example but has no library changes. SMU Y is a partial supercede over X because there are some components that overlap.

You must install both SMUs in order to get both fixes. The SMU is built to include this dependency; while you install Y, the SMU indicates that X is needed as well.

Prerequisites

A prerequisite SMU is an SMU that must be installed in order to install another SMU.

In the example mentioned previously, Y has a prerequisite of SMU X. That means that, in order to run Y, you need X as well.

Certain fixes can have a dependency on a previously posted SMU for a complete solution. This is true for scenarios where a composite SMU is built and is followed by another SMU for a fix that touches one of the components included in the composite SMU.

So, by definition, if a new SMU contains fixes for separate components within the same package, and if there is an SMU that exists that contains at least one, but not all, of these components, the first SMU is not completely superceded by the new SMU. Both the old and new SMUs are required for a complete fix. Prerequisite SMUs must be activated either concurrently or before the new SMU is loaded.

Keep Track of SMU Prerequisites and Supercedes

SMUs that are fully superceded are removed from Cisco.com and the File Exchange in order to avoid confusion.

SMU Readme files document prerequisites and supercede.

The Cisco Software Manager helps manage SMUs because it identifies superceded and prerequisite SMUs and provides SMU recommendations and optimized SMU lists. Refer to the Cisco Software Manager User Guide for details.

In the latest Cisco IOS XR software releases, a message is displayed during the install operation when an SMU is activated that supercedes another. A composite SMU can contain multiple components. You can deactivate or remove some components of an SMU that have been superceded by another SMU without deactivation of the other SMUs.

This output helps identify what SMU packages have been superceded by other active packages and can be deactivated. The line items listed can be deactivated, but not the entire composite SMU. There is no problem if you continue to operate with SMU packages active that have been superceded by other active SMUs.

```
Info:     After this install operation, some SMU package(s) will be superceded.
          User can deactivate and remove superceded SMU(s).
Info:     asr9k-fwding-4.2.3.CSCud39254-1.0.0
```

```
Info:     asr9k-fwding-4.2.3.CSCuc84257-1.0.0
Info:     asr9k-fwding-4.2.3.CSCud19188-1.0.0
Info:     asr9k-cpp-4.2.3.CSCud19188-1.0.0
Info:     asr9k-base-4.2.3.CSCud81064-1.0.0
Info:     asr9k-base-4.2.3.CSCud54093-1.0.0
Info:     asr9k-base-4.2.3.CSCud37351-1.0.0
Info:     asr9k-base-4.2.3.CSCuc84257-1.0.0
Info:     asr9k-os-mbi-4.2.3.CSCud37351-1.0.0
Info:     asr9k-os-mbi-4.2.3.CSCuc84257-1.0.0
Info:     asr9k-fwding-4.2.3.CSCud39254-1.0.0
Info:     asr9k-fwding-4.2.3.CSCuc59492-1.0.0
Info:     asr9k-fwding-4.2.3.CSCuc84257-1.0.0
Info:     asr9k-fwding-4.2.3.CSCud19188-1.0.0
Info:     asr9k-cpp-4.2.3.CSCud19188-1.0.0
Info:     iosxr-routing-4.2.3.CSCud08809-1.0.0
Info:     asr9k-base-4.2.3.CSCud81064-1.0.0
Info:     asr9k-base-4.2.3.CSCud54093-1.0.0
Info:     asr9k-base-4.2.3.CSCud37351-1.0.0
Info:     asr9k-base-4.2.3.CSCuc84257-1.0.0
Info:     asr9k-os-mbi-4.2.3.CSCud37351-1.0.0
Info:     asr9k-os-mbi-4.2.3.CSCuc84257-1.0.0
```

In Cisco IOS XR software Release 4.3.0 and later, use the **show install superceded** admin command in order to help identify SMUs that have been fully superceded by other active SMUs and that can later be deactivated and removed.

```
RP/0/RP0/CPU0:ASR9922(admin)#show install superceded
Thu May 23 01:03:25.567 UTC
There are no fully superceded SMUs.
```

SMU Installation

SMU activation requires three operational steps:

1. Add the SMU to the filesystem with the **admin install add** command.
2. Activate the SMU on the system with the **admin install activate** command.
3. Once confirmed that the system works as expected with the new SMU, make the installation persistent across reloads with the **admin install commit** command.

Install Add Operation

Use the install add operation in order to add an SMU to the file system. The install add operation adds all the SMU files to the filesystem but does not cause the SMU components to run or cause reloads or processes to restart.

There are several ways to perform an install add operation:

- Perform install add and install activate operations from admin mode or prefix the command with the admin keyword.
- Use the tar keyword in order to install and add individual SMUs that are in the .tar format or recommended SMU tarballs.
- Copy the SMU to a hard disk: or other local media first, and then add from the local media.

- Add the SMU to the filesystem directly from a TFTP or FTP file server that is reachable from the router. Note that:
  - The SMU file must be available on the FTP or TFTP server and have proper read permissions for the FTP or TFTP operation.
  - If the files on the FTP or TFTP server are not in the tftpboot directory, add the fully qualified path to the file on the FTP or TFTP server. In the , the files were in the tftpboot

    directory on the server tftp://10.0.0.1/asr9k-p-4.2.1. Cisco bug ID CSCue28217 .tar . Had they been in /tftpboot/smu then the command tftp://10.0.0.1/smu/asr9k-p-4.2.1. Cisco

    bug ID CSCue28217
    .tar is used.

Example Install Add Operation - TFTP and tar File

```
RP/0/RSP0/CPU0:ASR9001(admin)#install add tar
   tftp://10.0.0.1/asr9k-p-4.2.1.CSCue28217
```

.tar
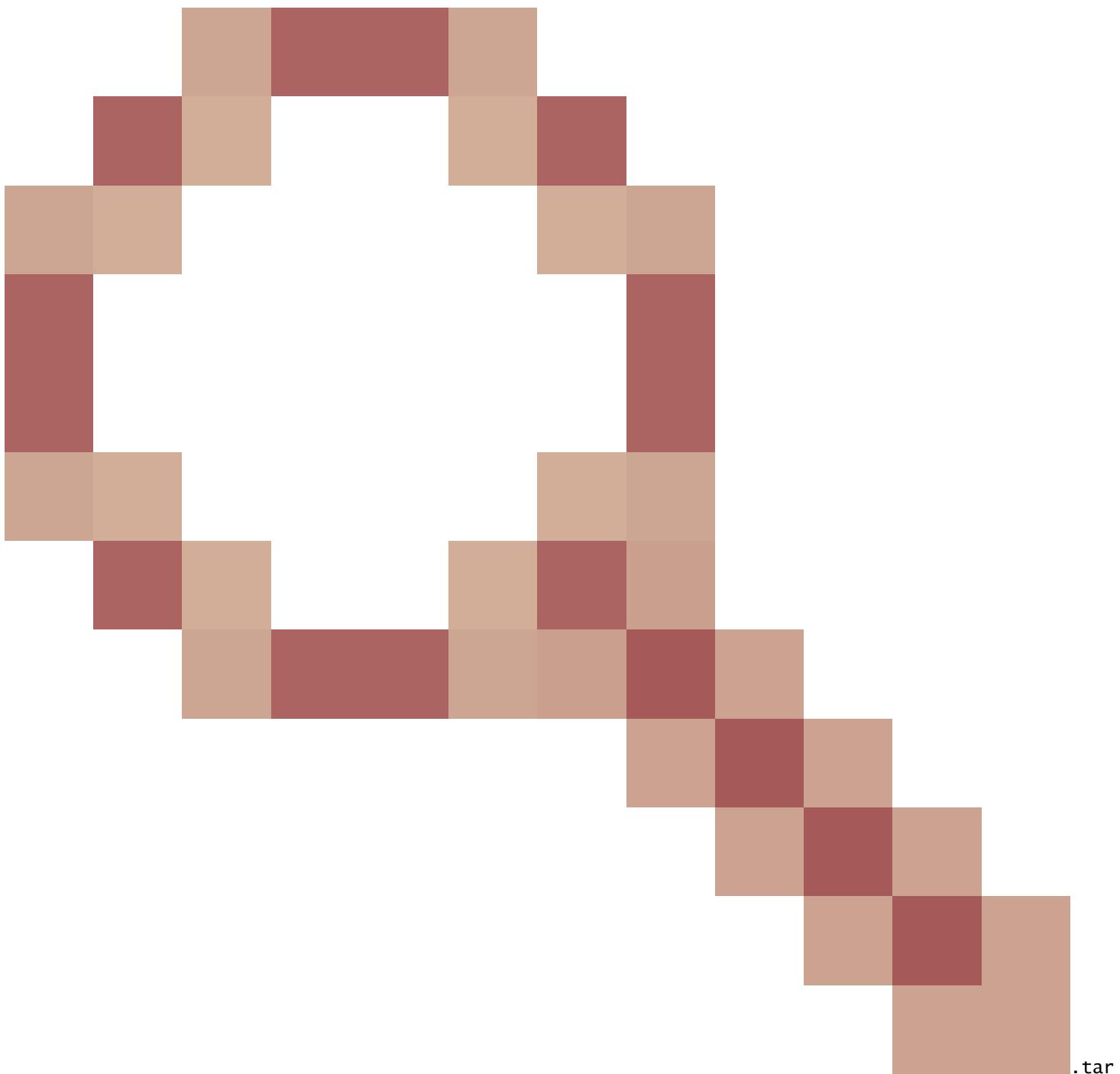
```
Tue May  7 00:43:59.610 UTC
Install operation 81 '(admin) install add tar
  /tftp://10.0.0.1/asr9k-p-4.2.1.CSCue28217
```

.tar' s
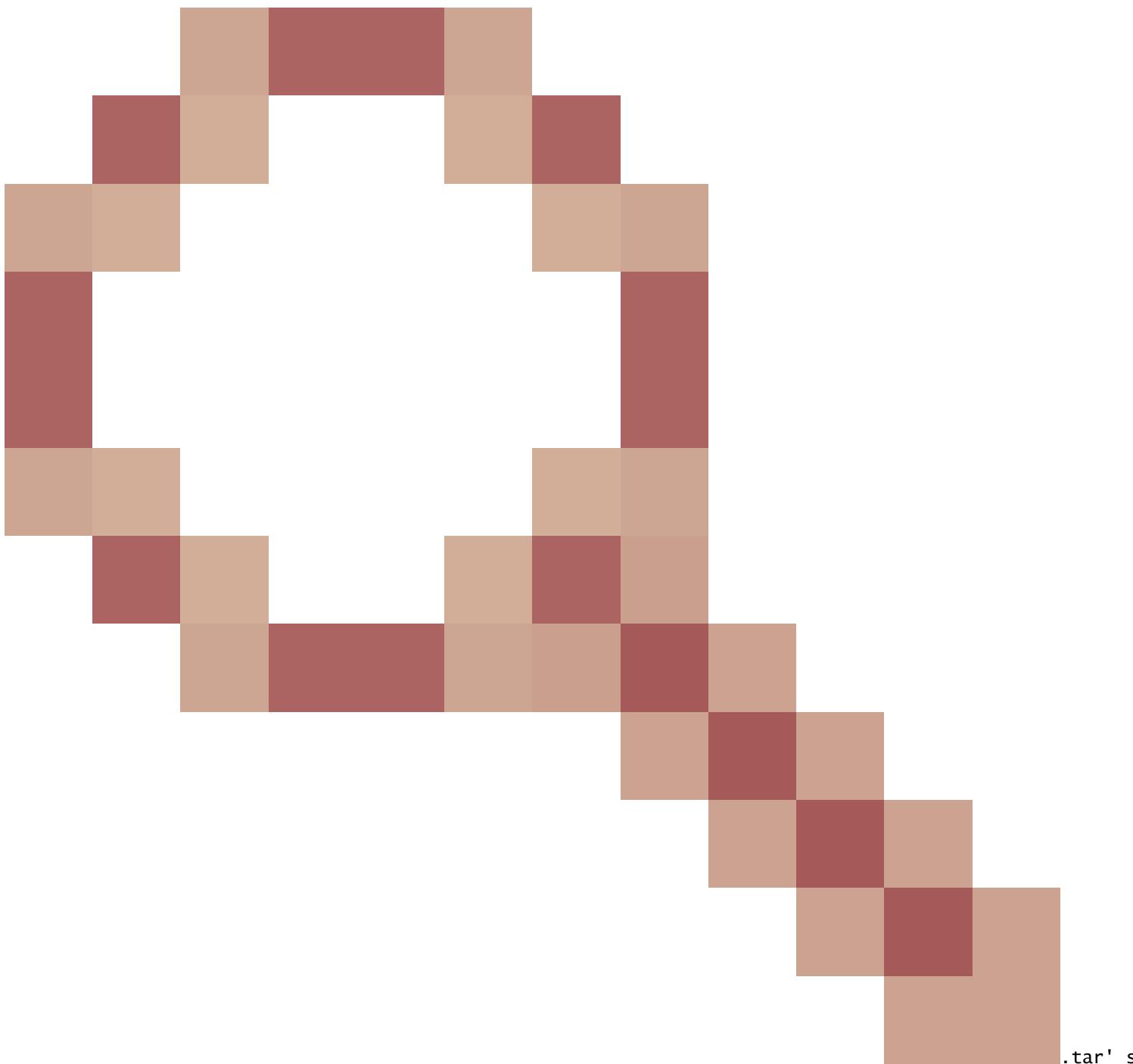
    via CLI at 00:43:59 UTC Tue
May 07 2013.
Info: The following files were extracted from the tar file
 '/tftp://10.0.0.1/asr9k-p-4.2.1.CSCue28217
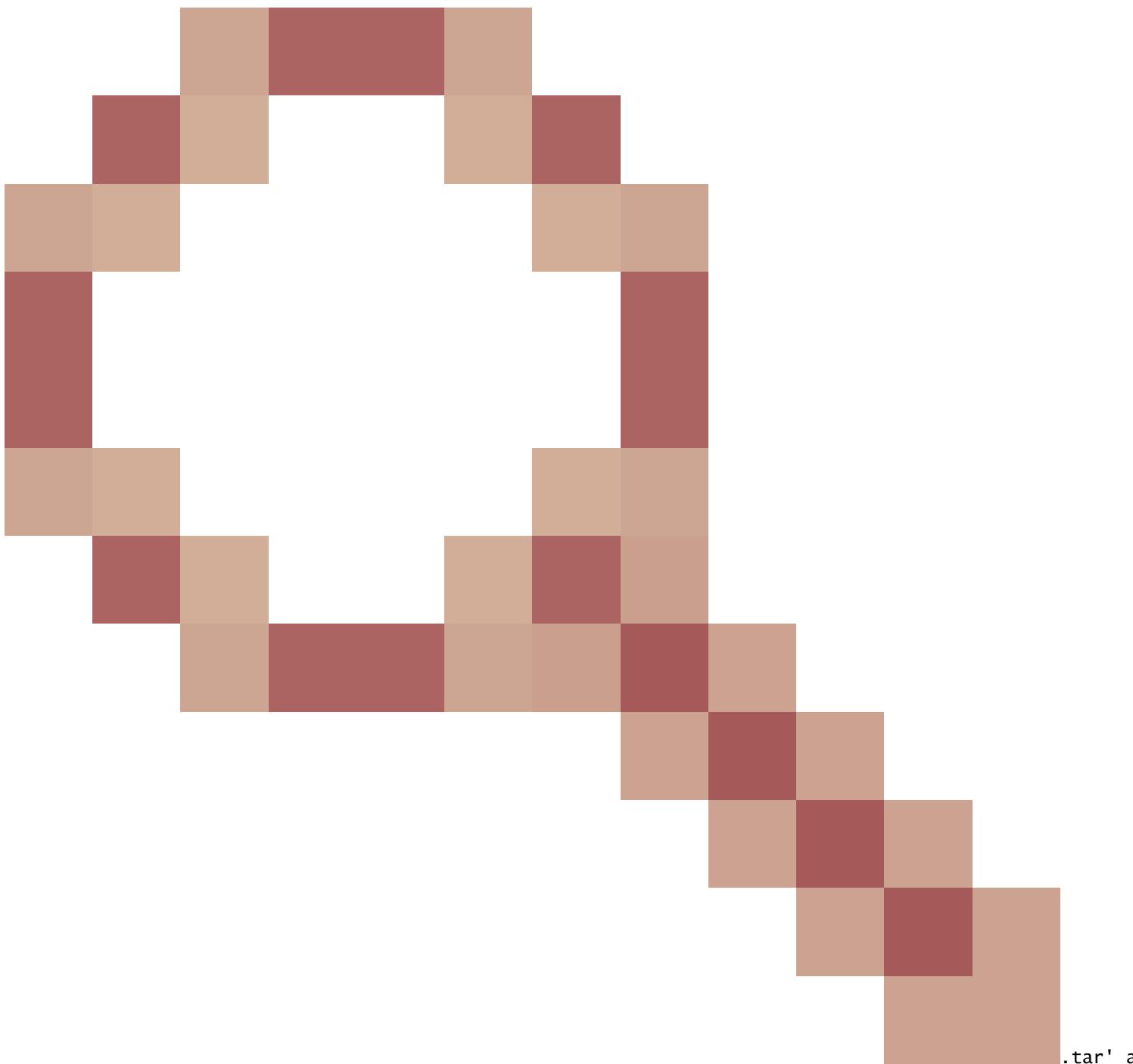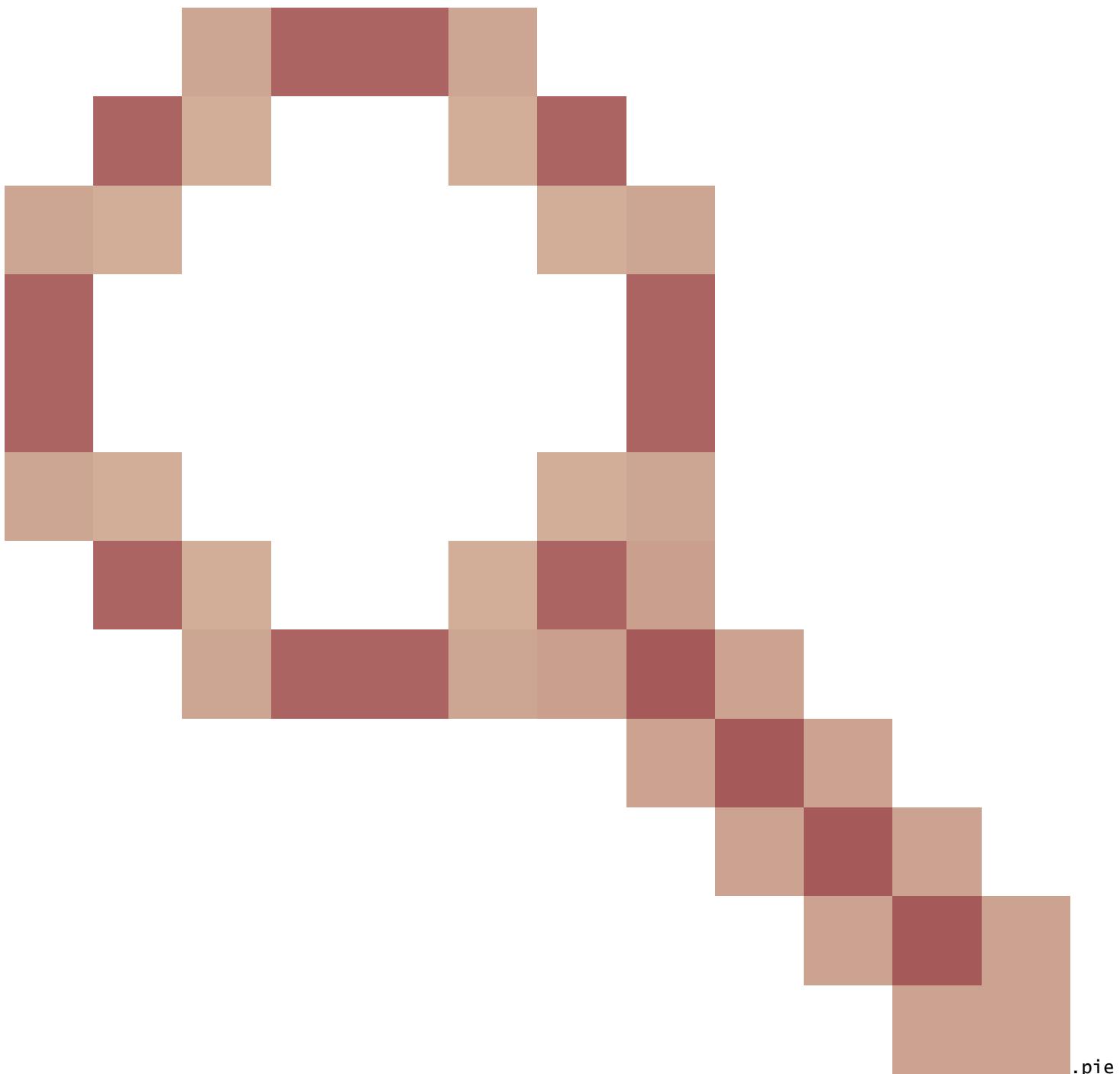
```
                                                                      .tar' a
 entire router:
Info:
Info:          asr9k-p-4.2.1.CSCue28217
```

Info: asr9k-p-4.2.1.CSCue28217.pie

.txt (s

```
Info:
The install operation will continue asynchronously.
RP/0/RSP0/CPU0:ASR9001(admin)#Info:     The following package is now available
 to be activated:
Info:
Info:          disk0:asr9k-p-4.2.1.CSCue28217-1.0.0
Info:
Info:      The package can be activated across the entire router.
Info:
Install operation 81 completed successfully at 00:44:41 UTC Tue May 07 2013.
```
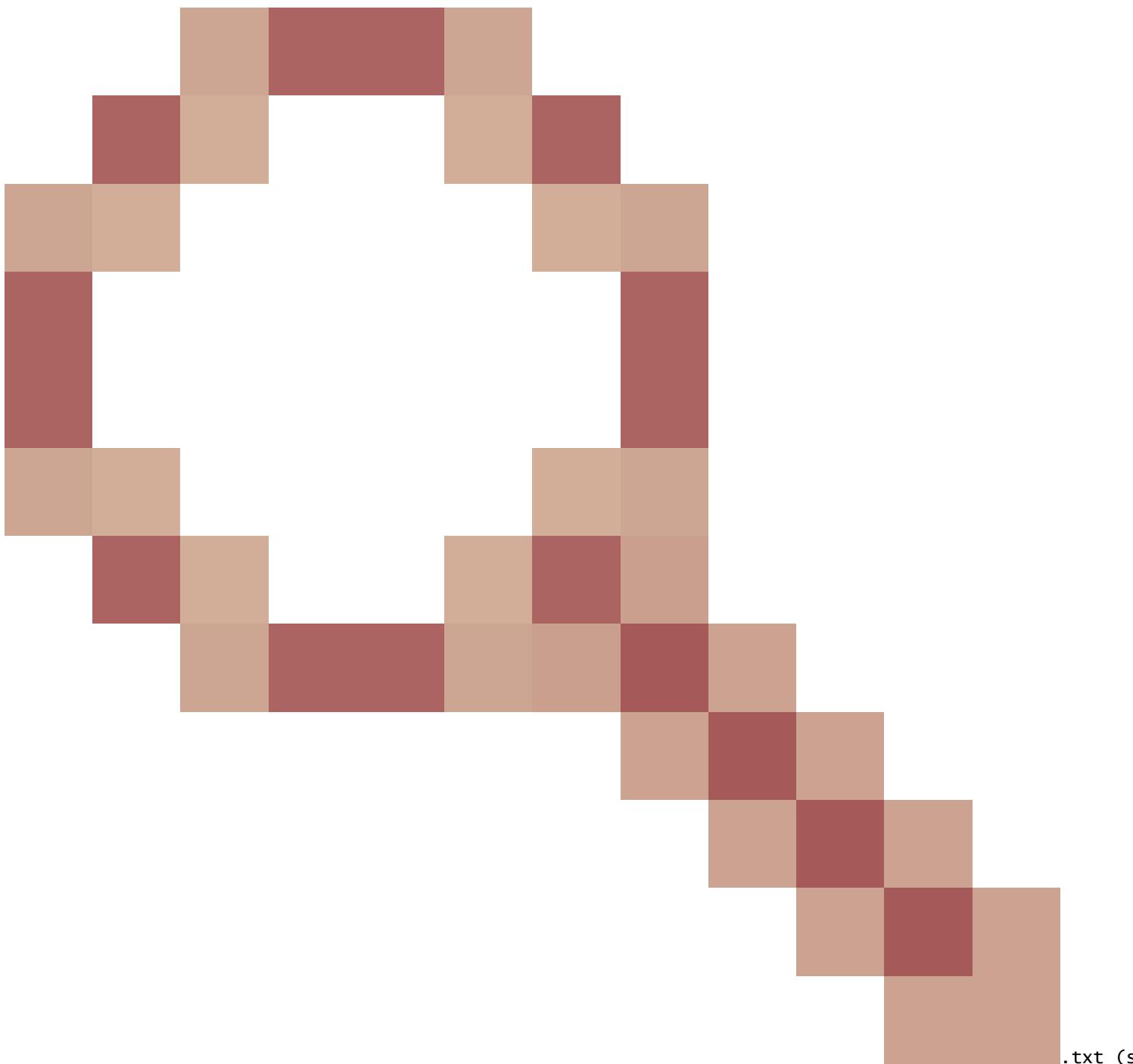
Example Install Add Operation - Hard disk: and tar File

The SMU can be copied to a hard disk: or other local media first, then be added from that local media.
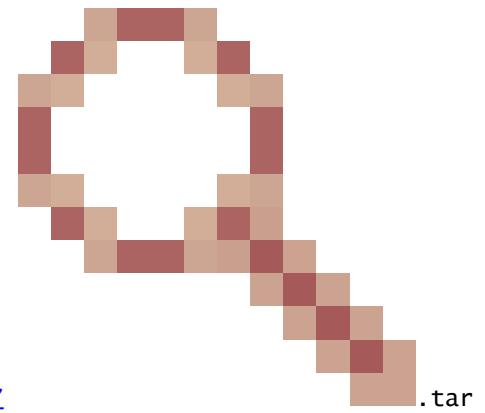
```
RP/0/RSP0/CPU0:ASR9001#copy tftp://10.0.0.1/asr9k-p-4.2.1.CSCue28217                    .tar
   harddisk:
Wed May  8 04:55:37.646 UTC




Destination filename [/harddisk:/asr9k-p-4.2.1.CSCue28217                    .tar]?




Accessing tftp://10.0.0.1/asr9k-p-4.2.1.CSCue28217                    .tar
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
686080 bytes copied in      1 sec (    581916)bytes/sec

RP/0/RSP0/CPU0:ASR9001#admin
Tue May  7 05:15:05.018 UTC

RP/0/RSP0/CPU0:ASR9001(admin)#install add tar
   harddisk:asr9k-p-4.2.1.CSCue28217
```
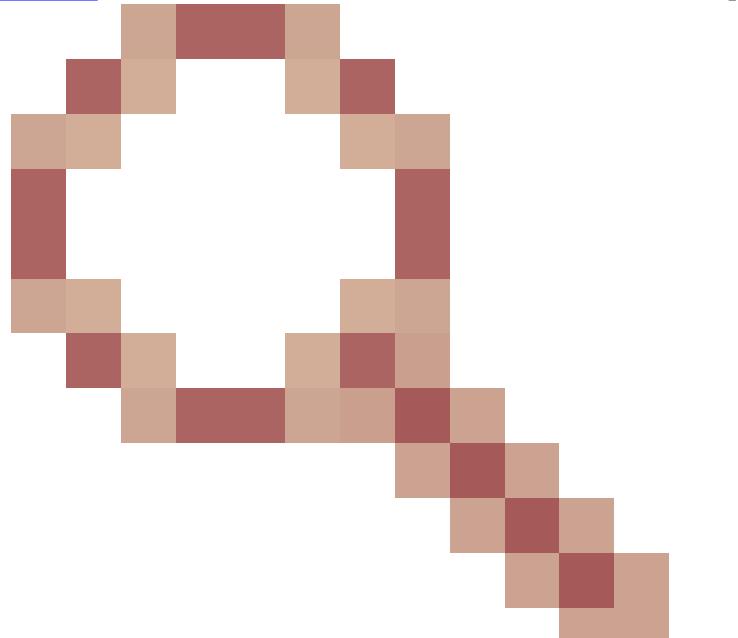
.tar
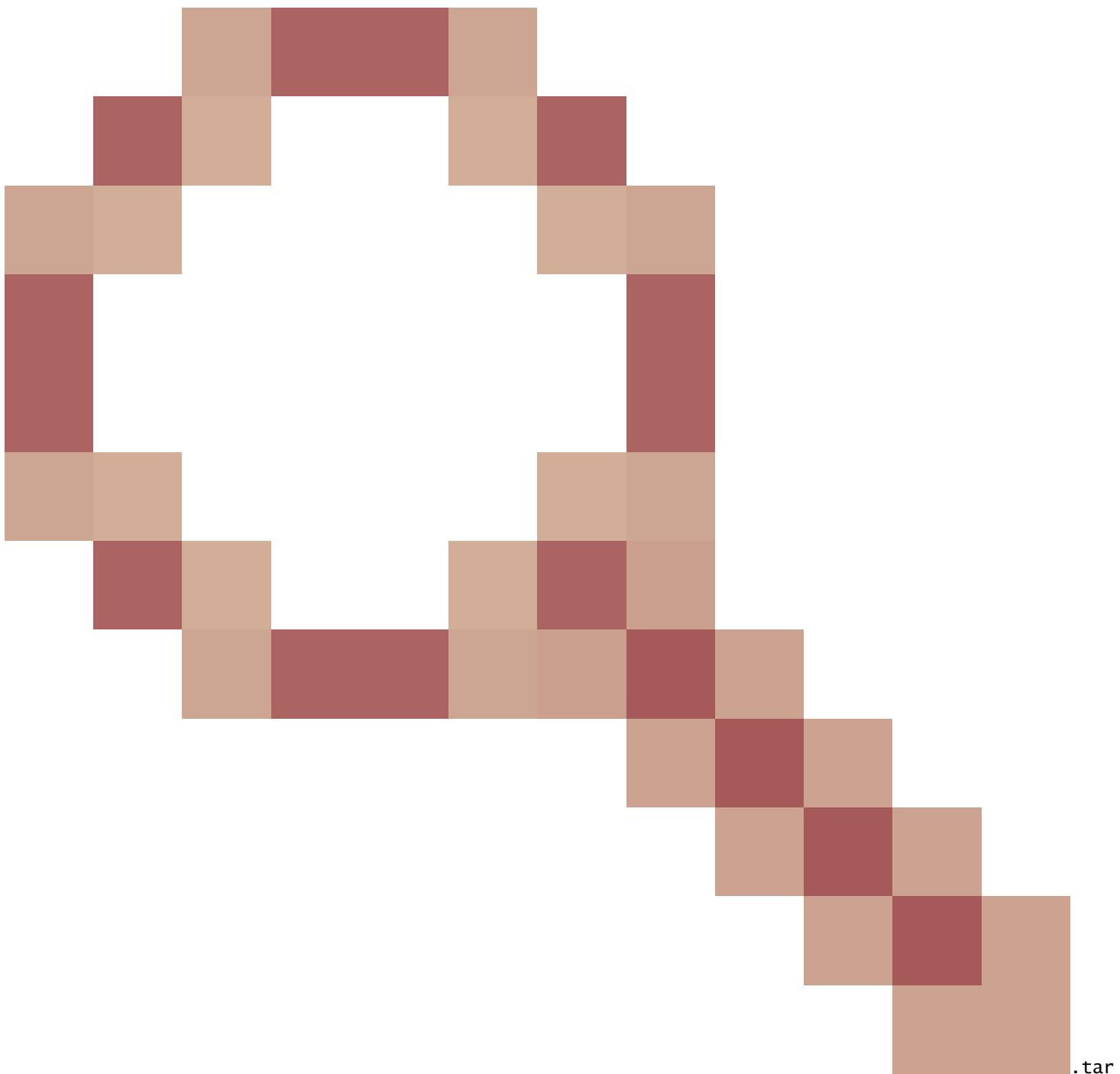
Tue May 7 00:53:59.507 UTC
Install operation 87 '(admin) install add tar
   /harddisk:asr9k-p-4.2.1.CSCue28217
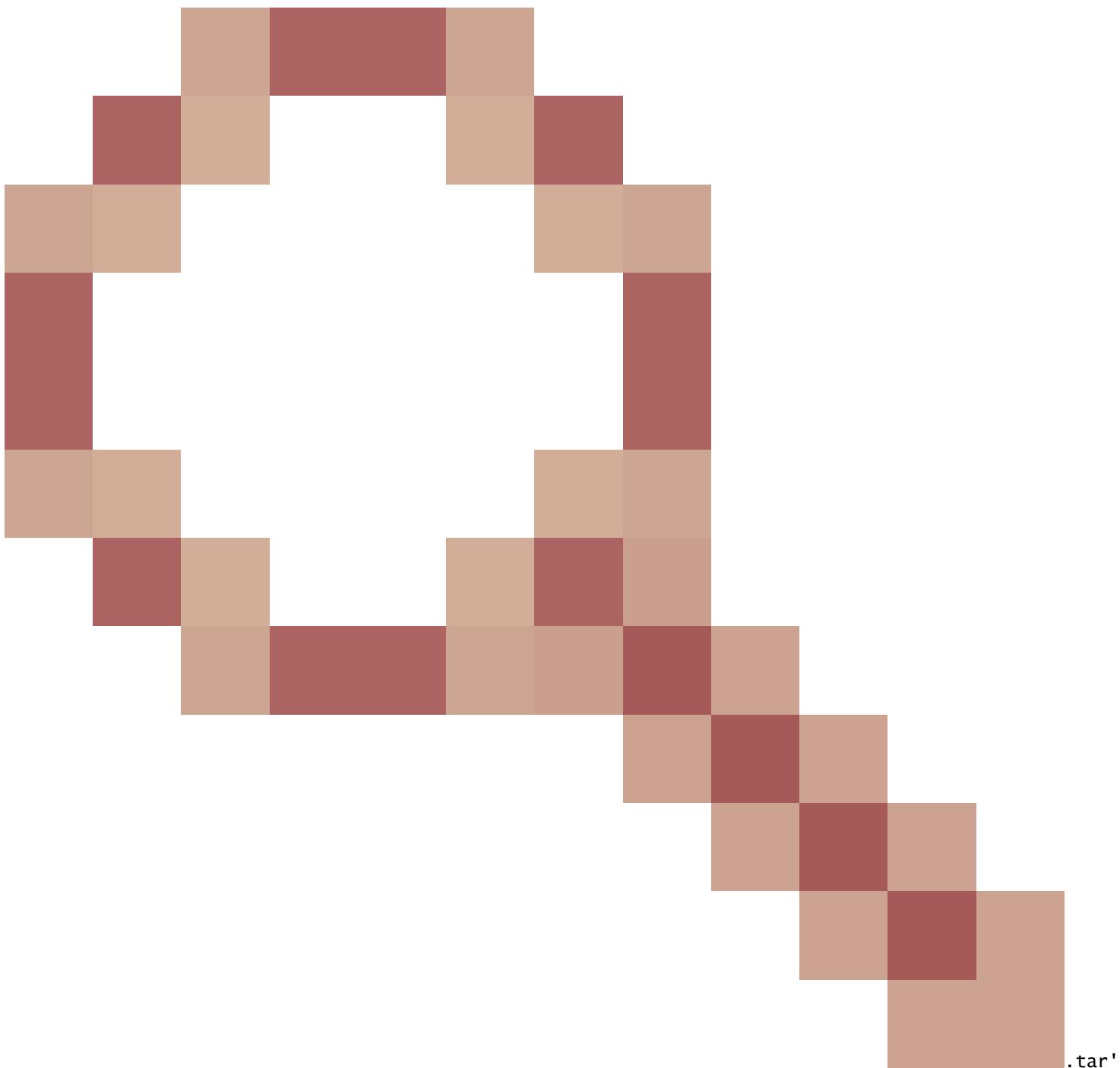
started by user 'root' via CLI at 00:53:59 UTC Tue May 07 2013.
Info: The following files were extracted from the tar file
          '/harddisk:asr9k-p-4.2.1.CSCue28217.tar'
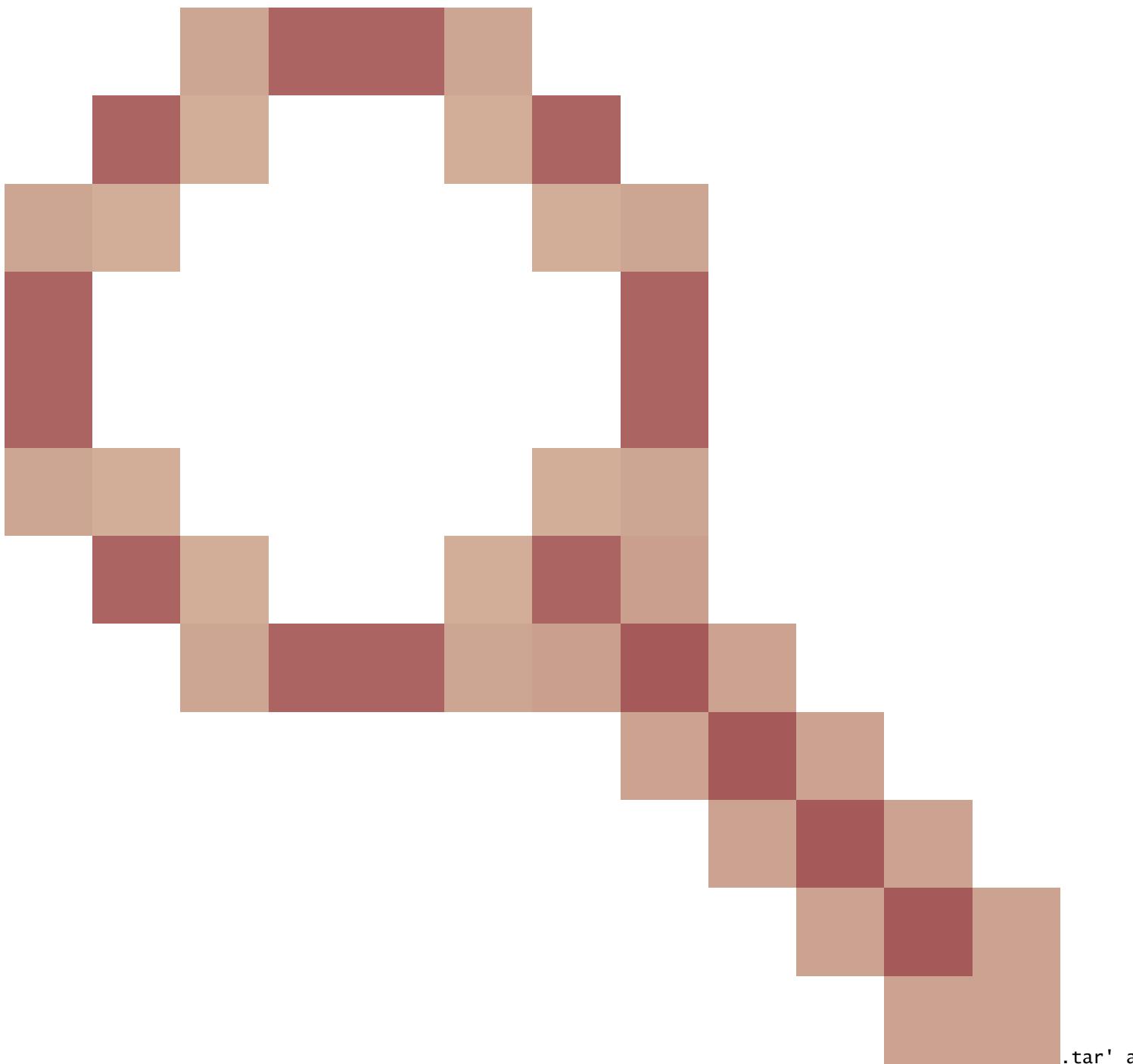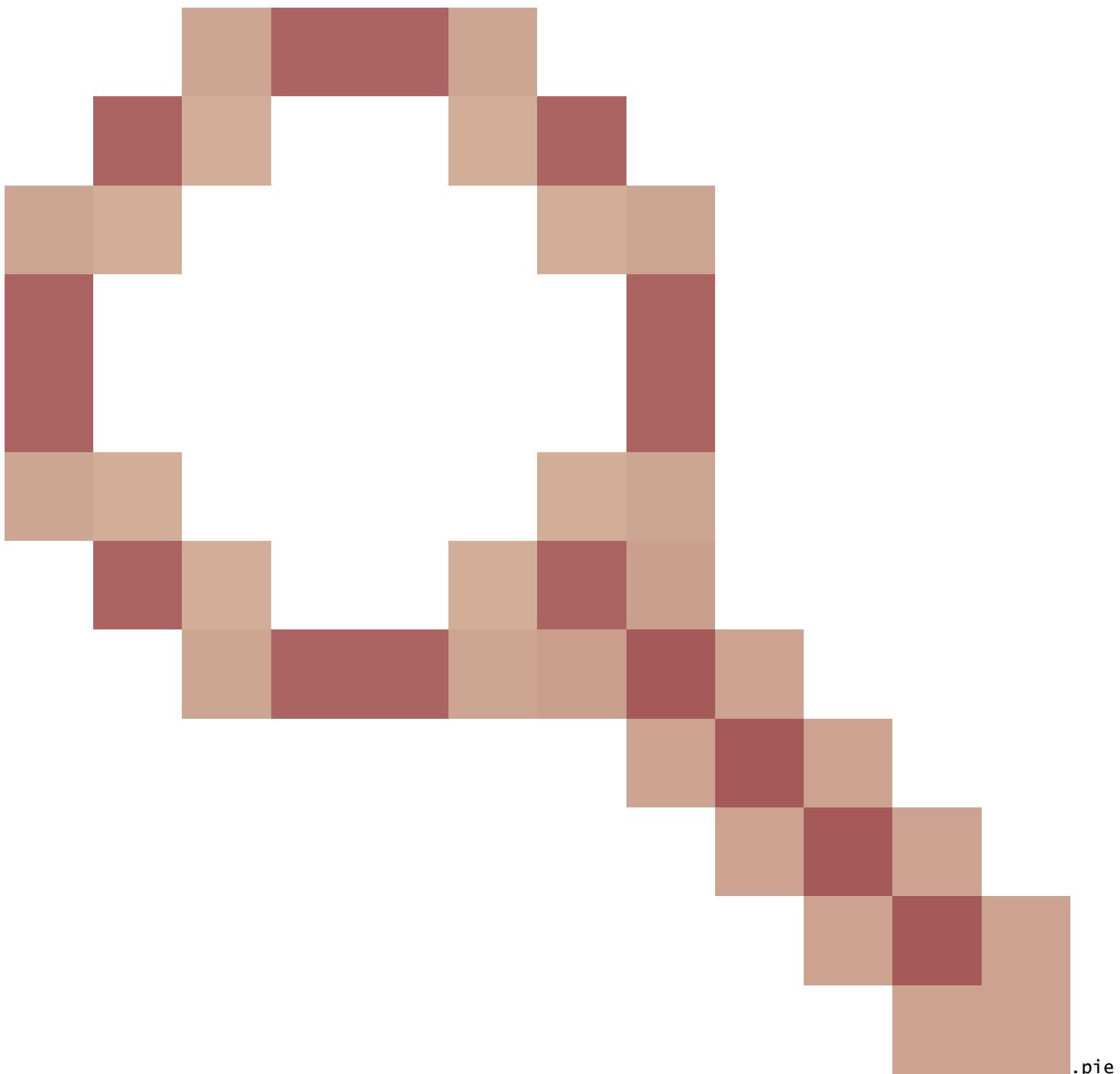
.tar' a

        entire router:
Info:
Info: asr9k-p-4.2.1.CSCue28217

Info: asr9k-p-4.2.1.CSCue28217.pie

.txt (s
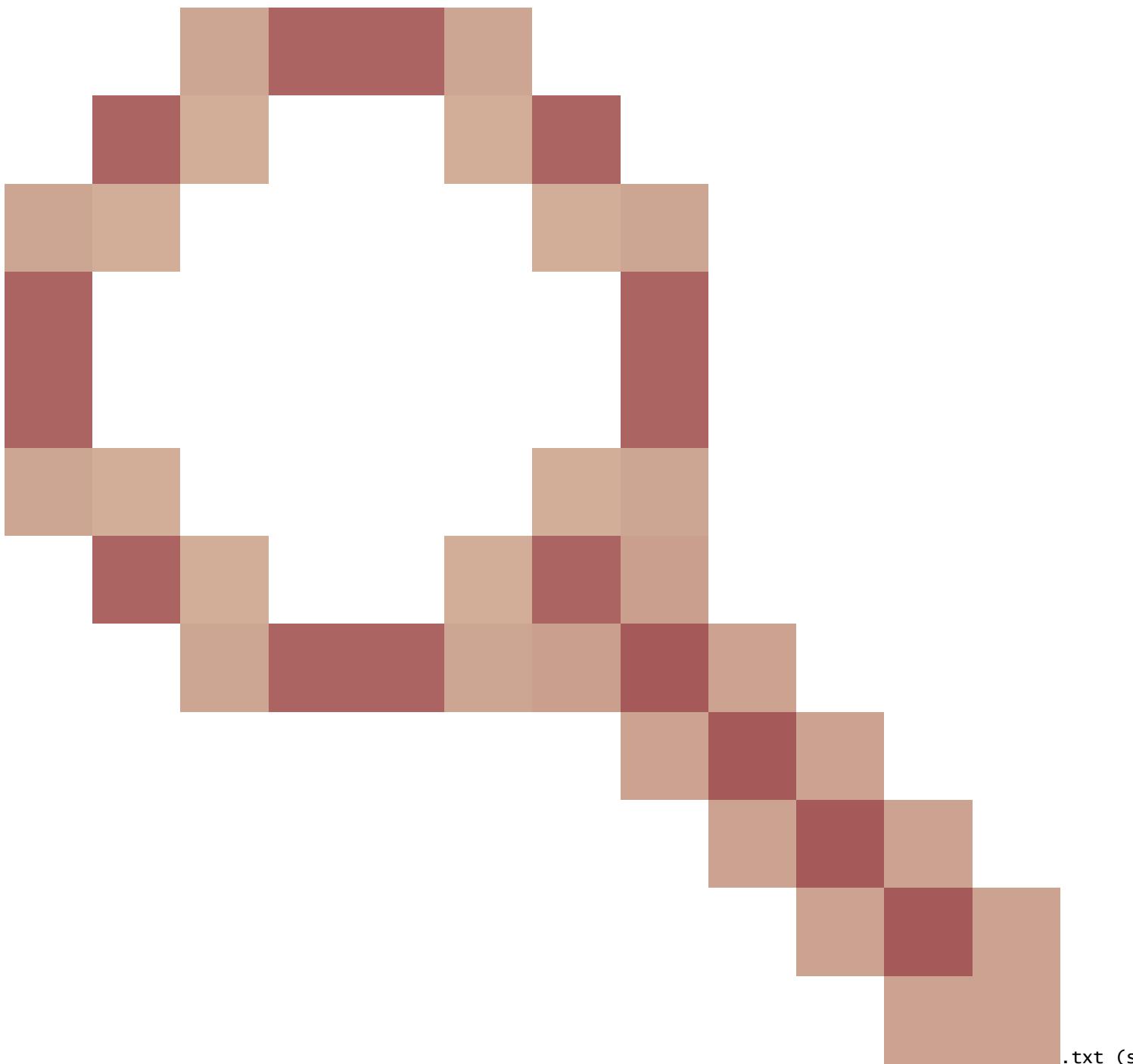
```
Info:
The install operation will continue asynchronously.
RP/0/RSP0/CPU0:ASR9001(admin)#Info:     The following package is now
                                 available to be activated:
Info:
Info:          disk0:asr9k-p-4.2.1.CSCue28217-1.0.0
Info:
Info:     The package can be activated across the entire router.
Info:
Install operation 87 completed successfully at 00:54:40 UTC Tue May 07 2013.
```

Example Install Add Operation - Recommended Tarball and TFTP

```
RP/0/RSP0/CPU0:ASR9001(admin)#install add tar
```

```
    tftp://10.0.0.1/4.2.1_asr9k-p_REC_SMUS_2013-03-23.tar
Tue May 14 00:47:23.650 UTC

Install logs:
    Install operation 131 '(admin) install add tar
    /tftp://10.0.0.1/4.2.1_asr9k-p_REC_SMUS_2013-03-23.tar' started by user 'root'
    via CLI at 00:47:24 UTC Tue May 14 2013.
    Info:      The following files were extracted from the tar file
               '/tftp://10.0.0.1/4.2.1_asr9k-p_REC_SMUS_2013-03-23.tar' and will be
    Info:      added to the entire router:
    Info:
```
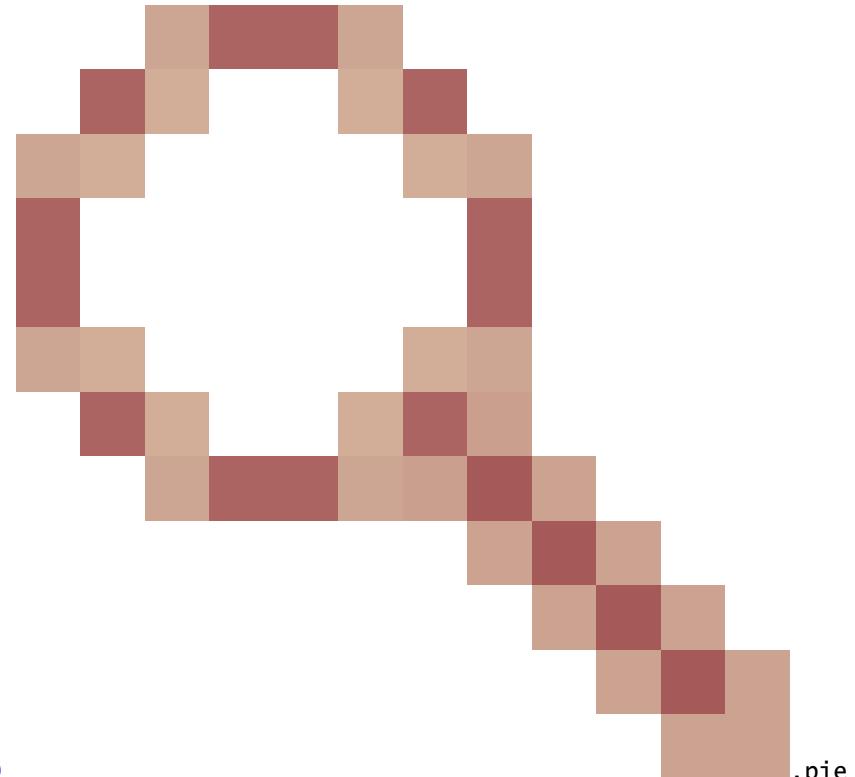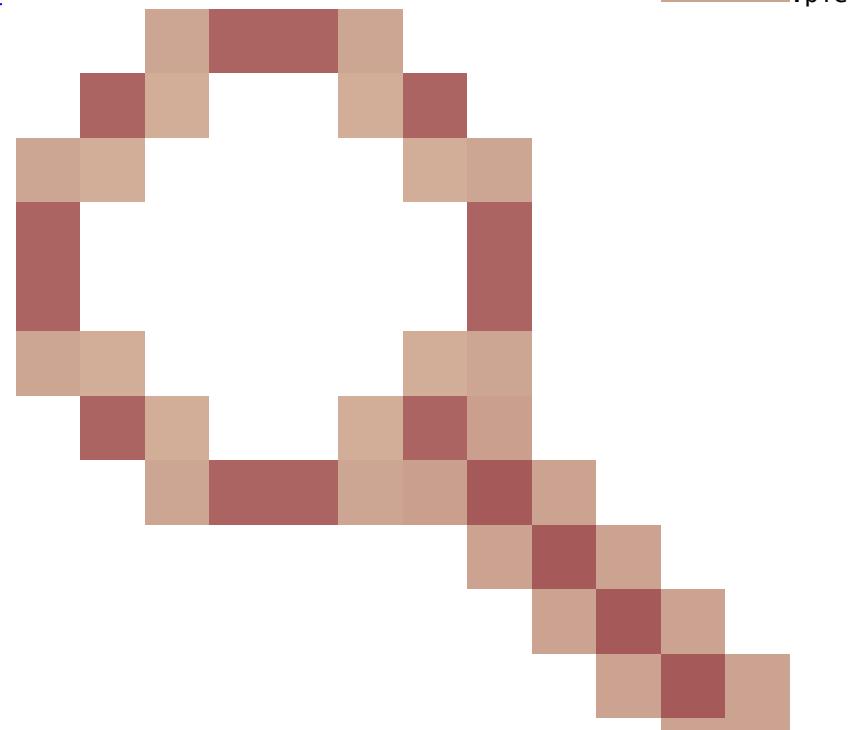
    Info: asr9k-p-4.2.1.CSCtr86240   .pie
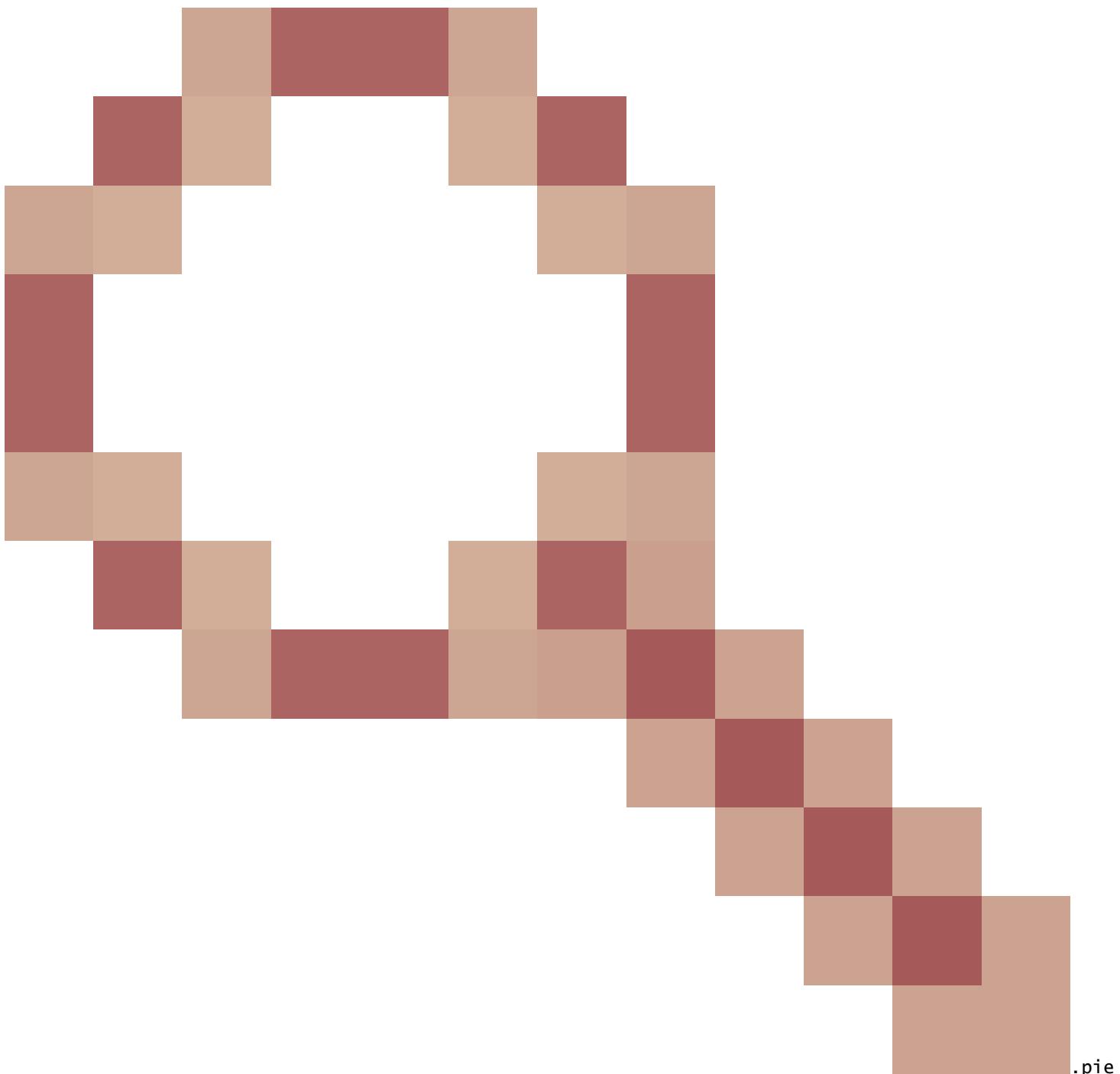
    Info: asr9k-p-4.2.1.CSCtr86240   .txt (s
    Info: asr9k-p-4.2.1.CSCty18600

Info: asr9k-p-4.2.1.CSCty18600.pie
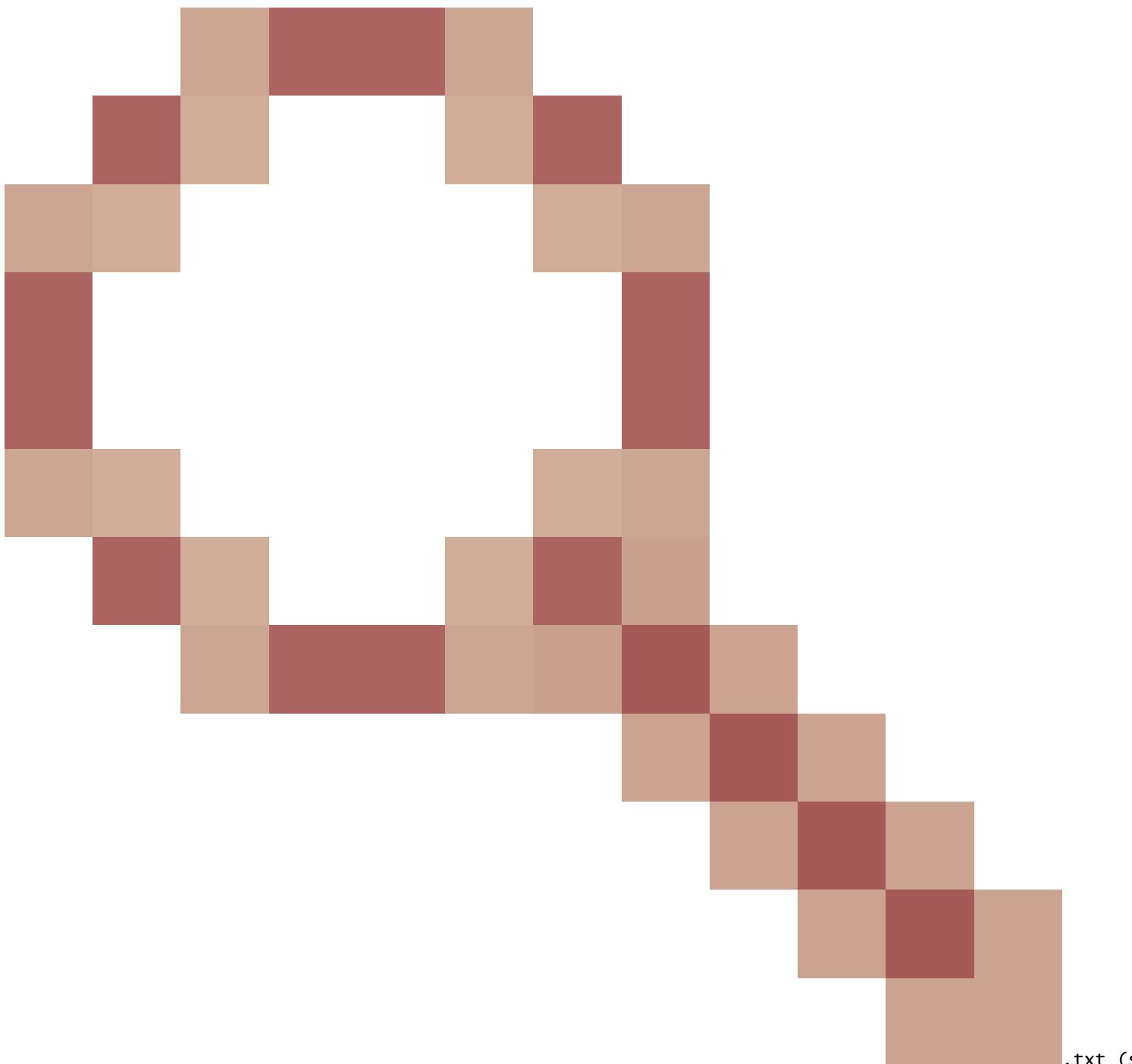
Info: asr9k-p-4.2.1.CSCty83866.txt (s
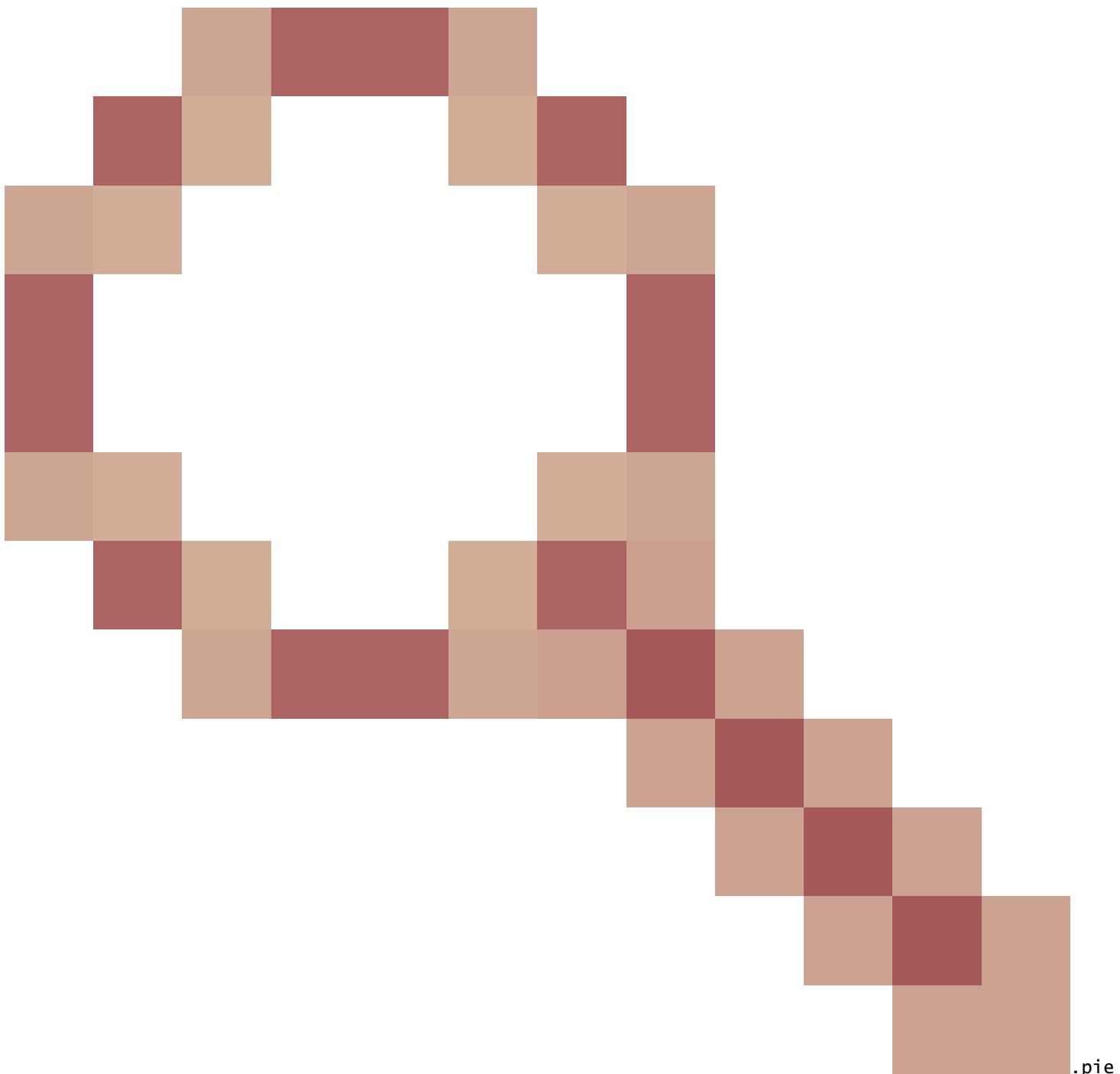
Info: asr9k-p-4.2.1.[CSCty83866](#).pie
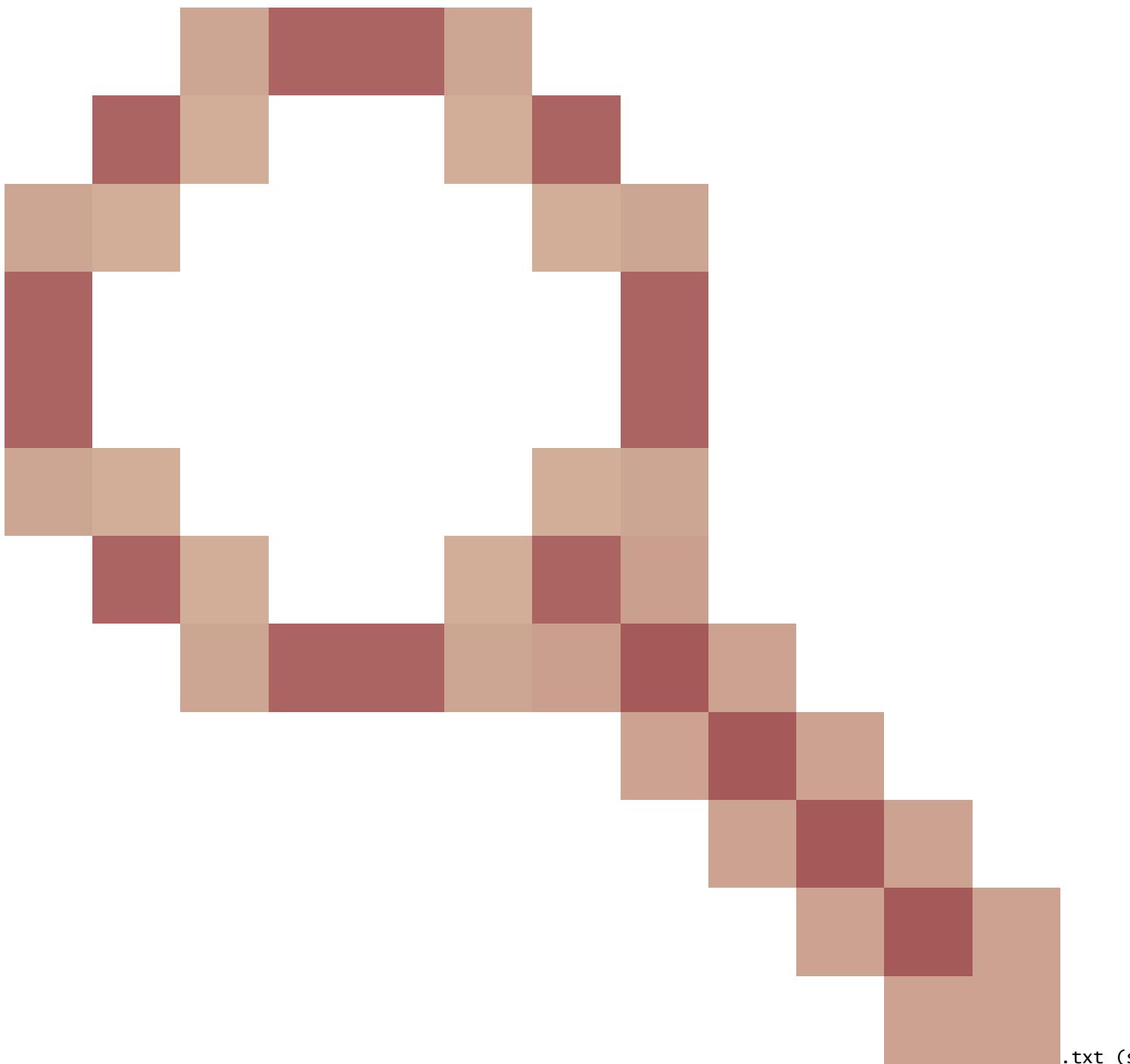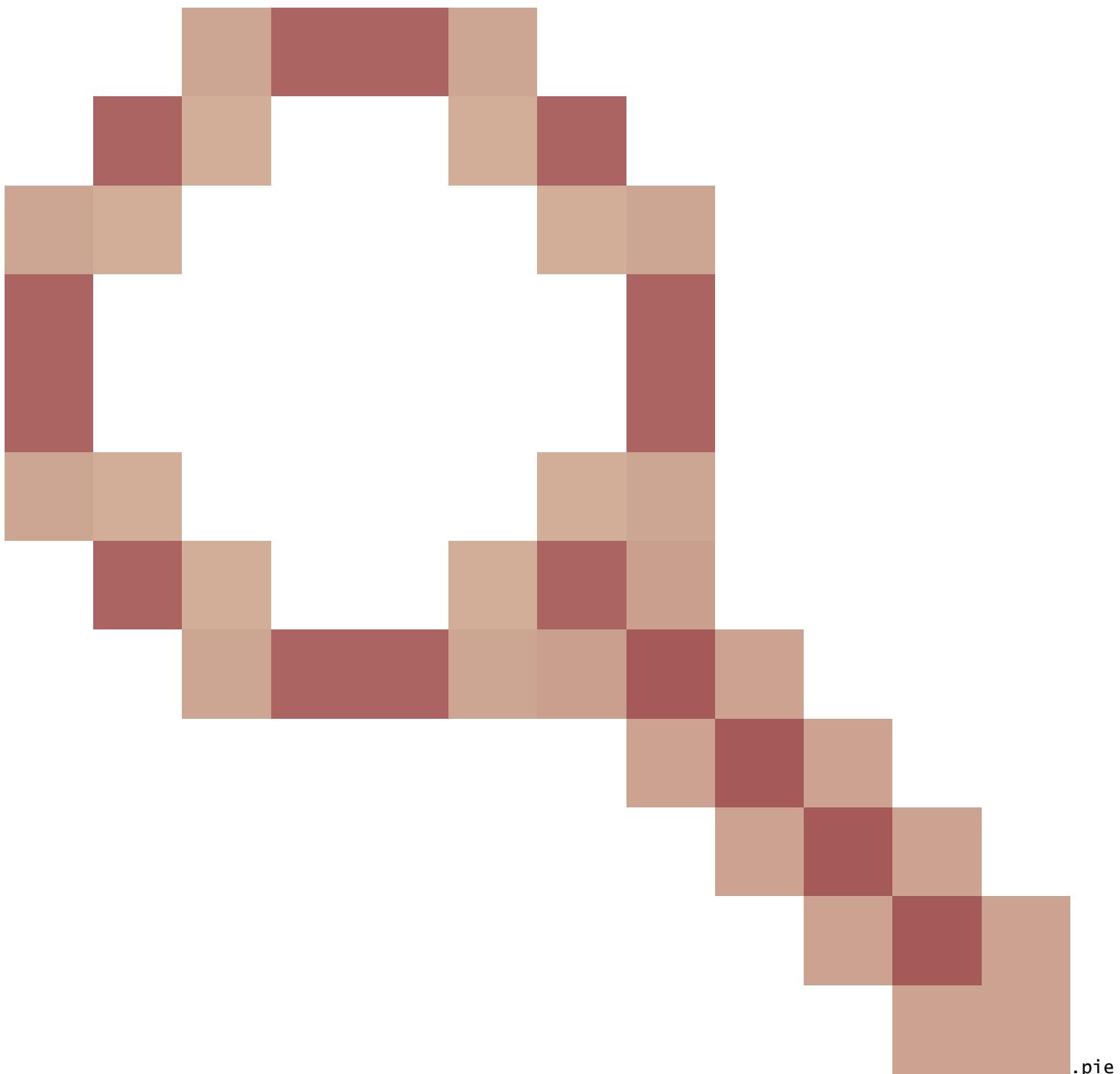
.txt (s

Info: asr9k-p-4.2.1.CSCty84643
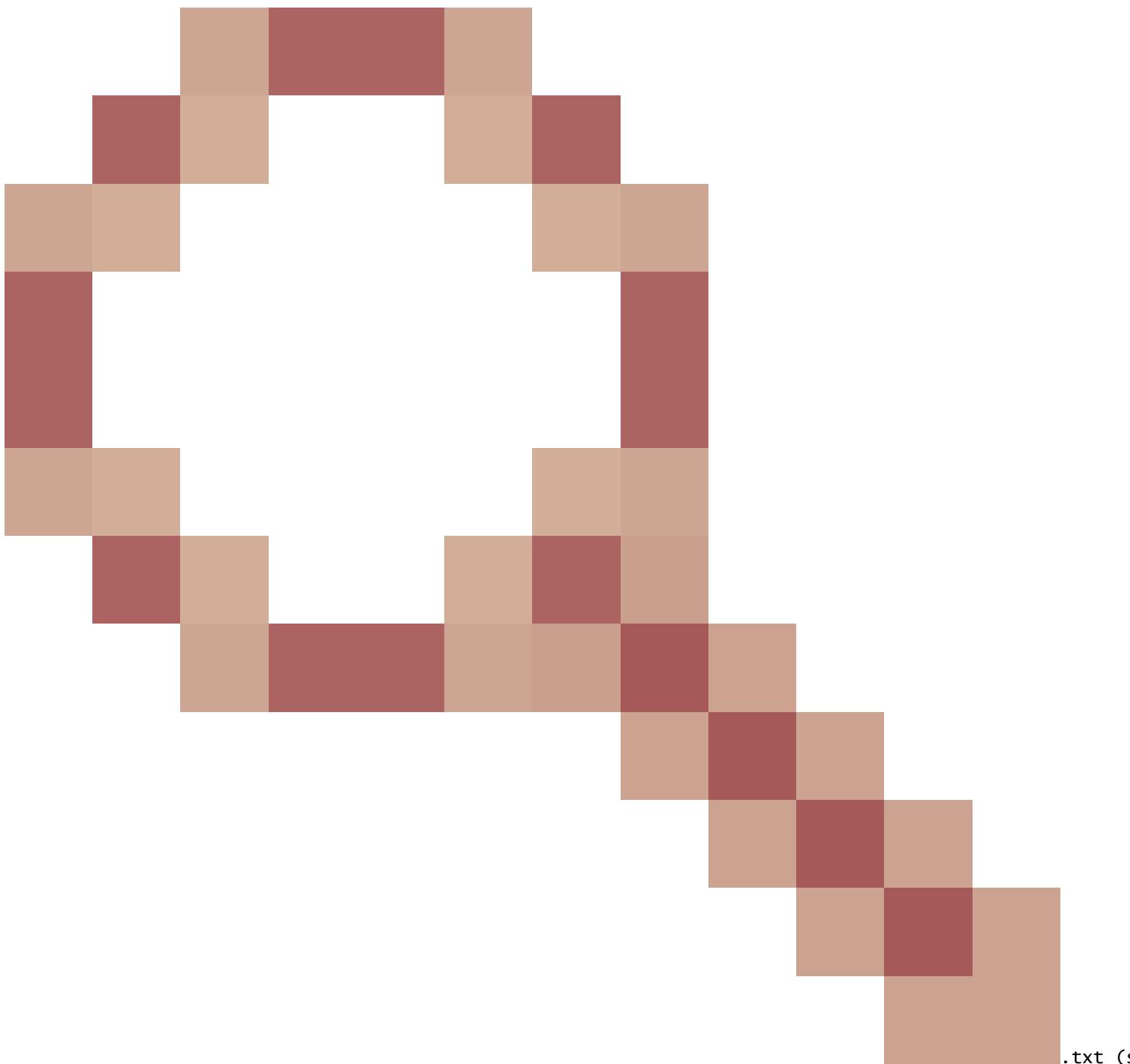
Info: asr9k-p-4.2.1.CSCty84643.pie
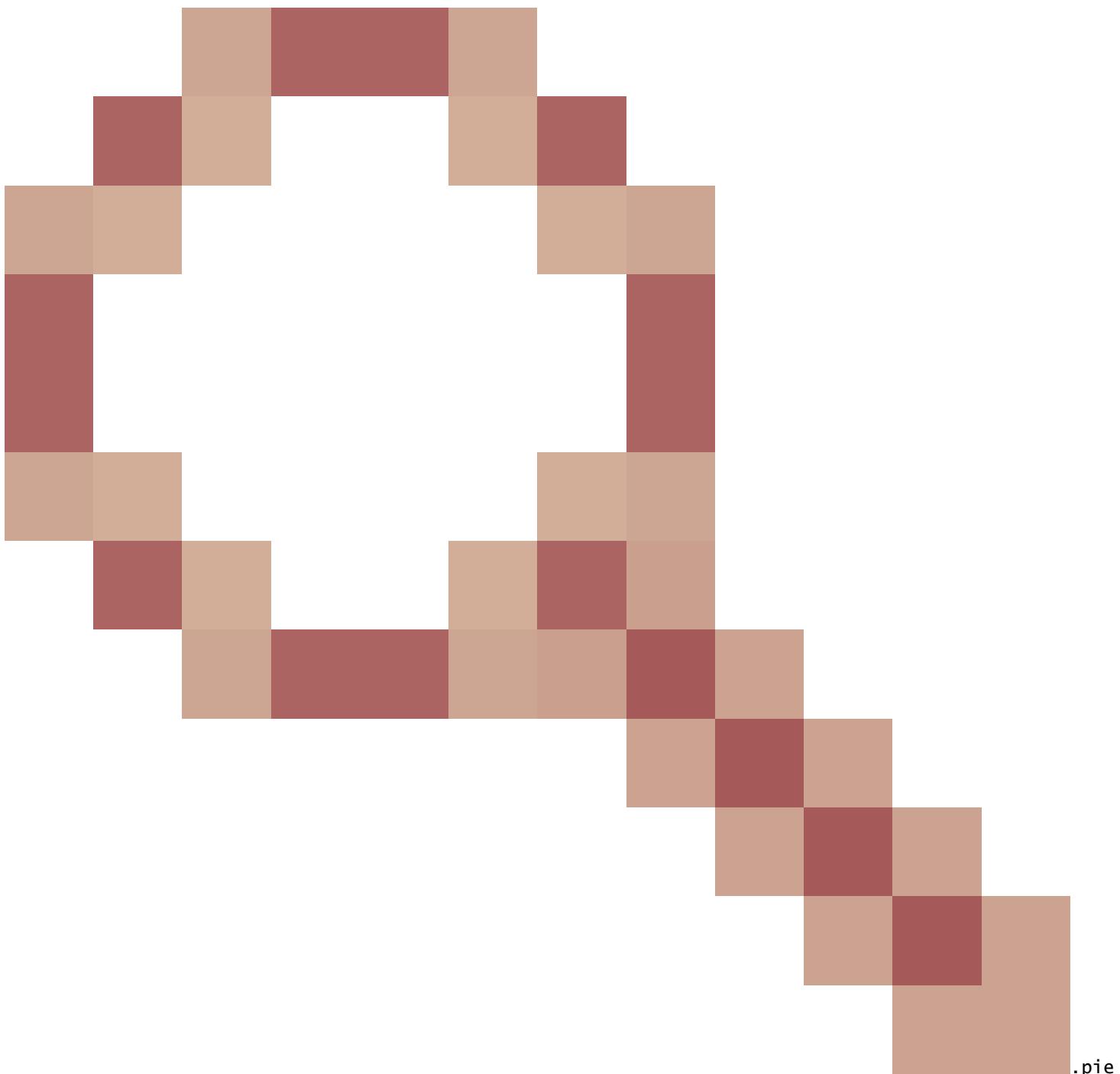
.txt (s

Info: asr9k-p-4.2.1.CSCty99591

Info: asr9k-p-4.2.1.CSCty99591.pie
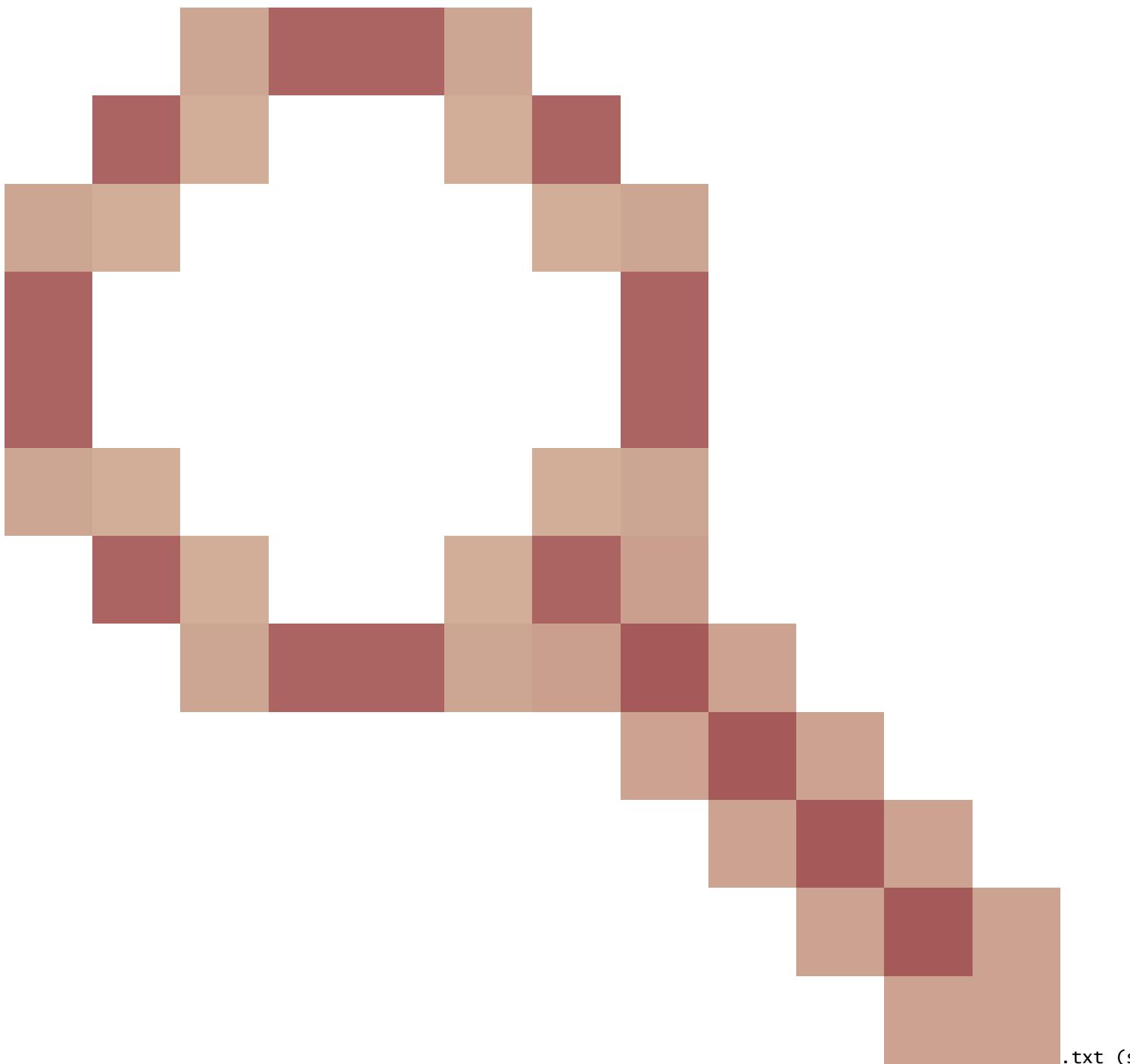
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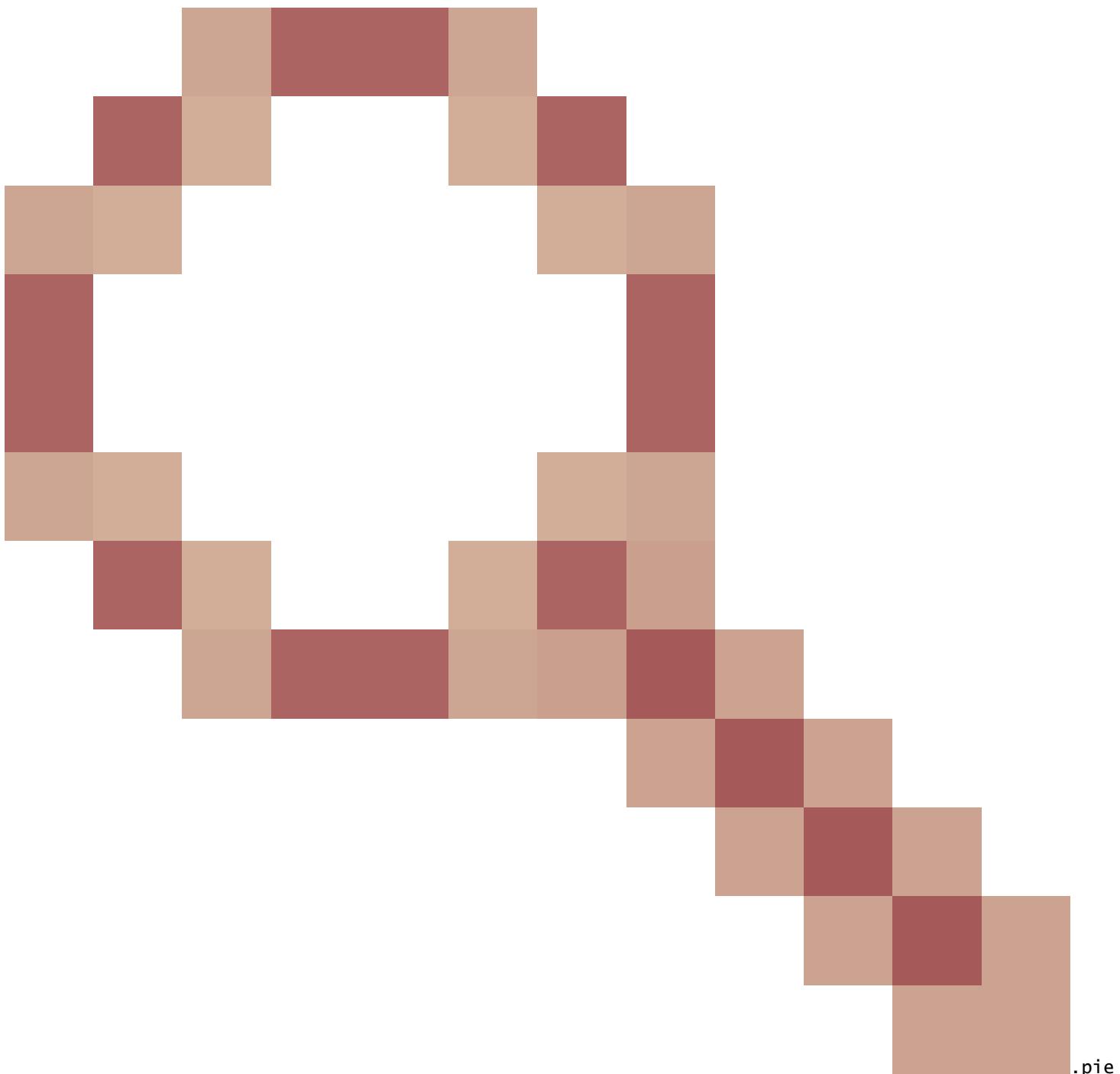
Info: asr9k-p-4.2.1.[CSCtz24398](#).pie
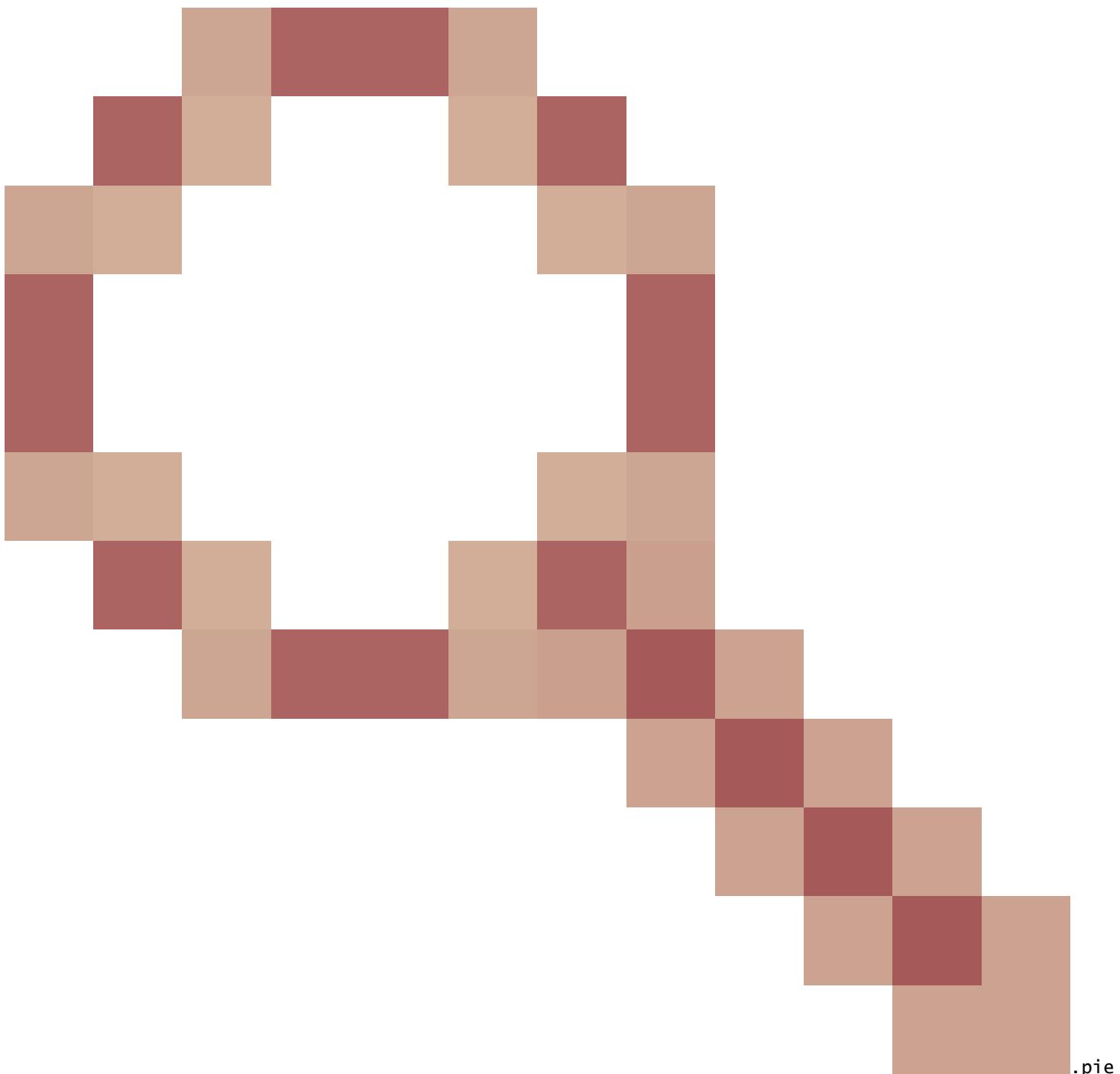
.txt (s

Info: asr9k-p-4.2.1.CSCtz62914

Info: asr9k-p-4.2.1.[CSCtz62914](#)

.txt (s

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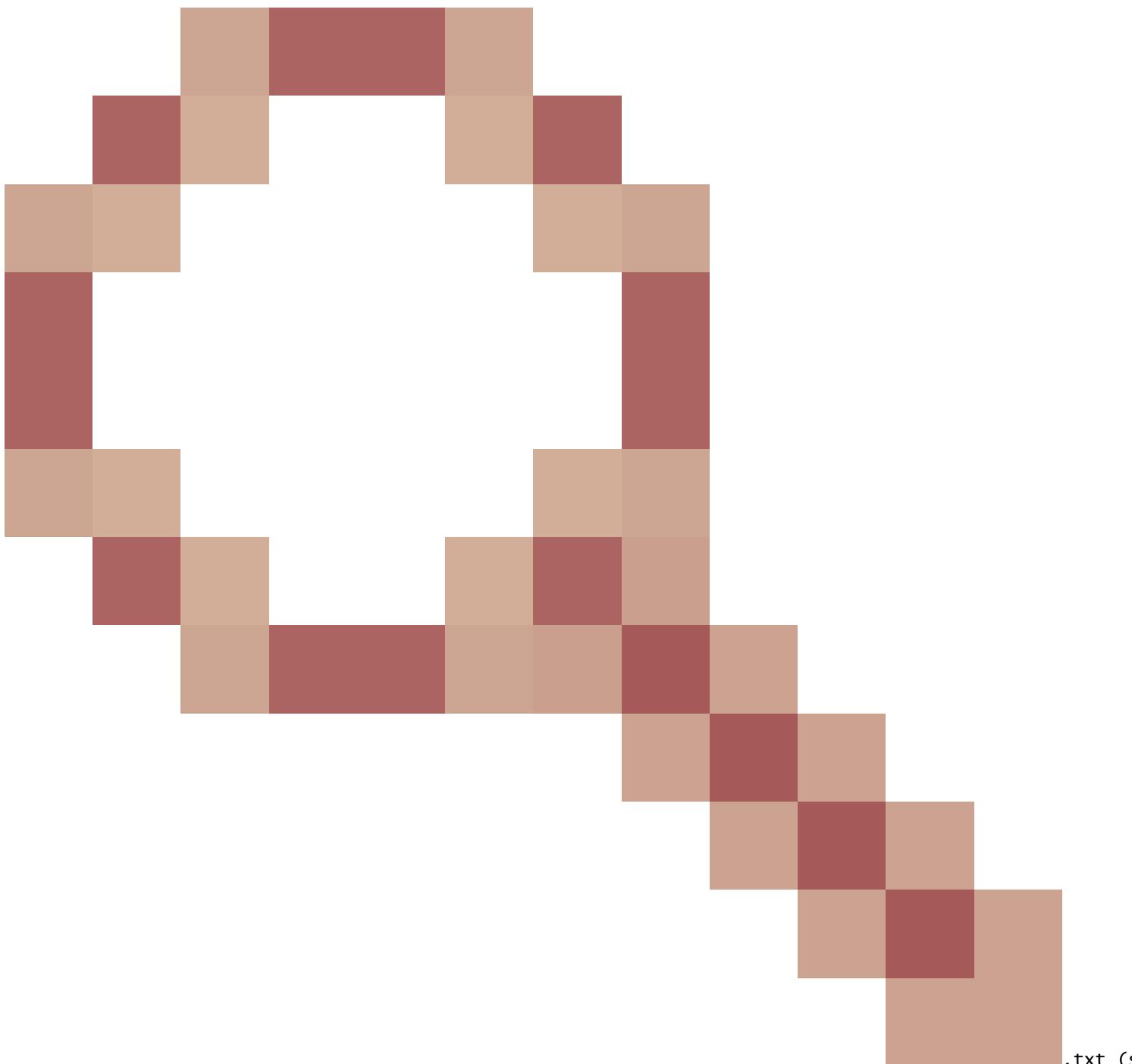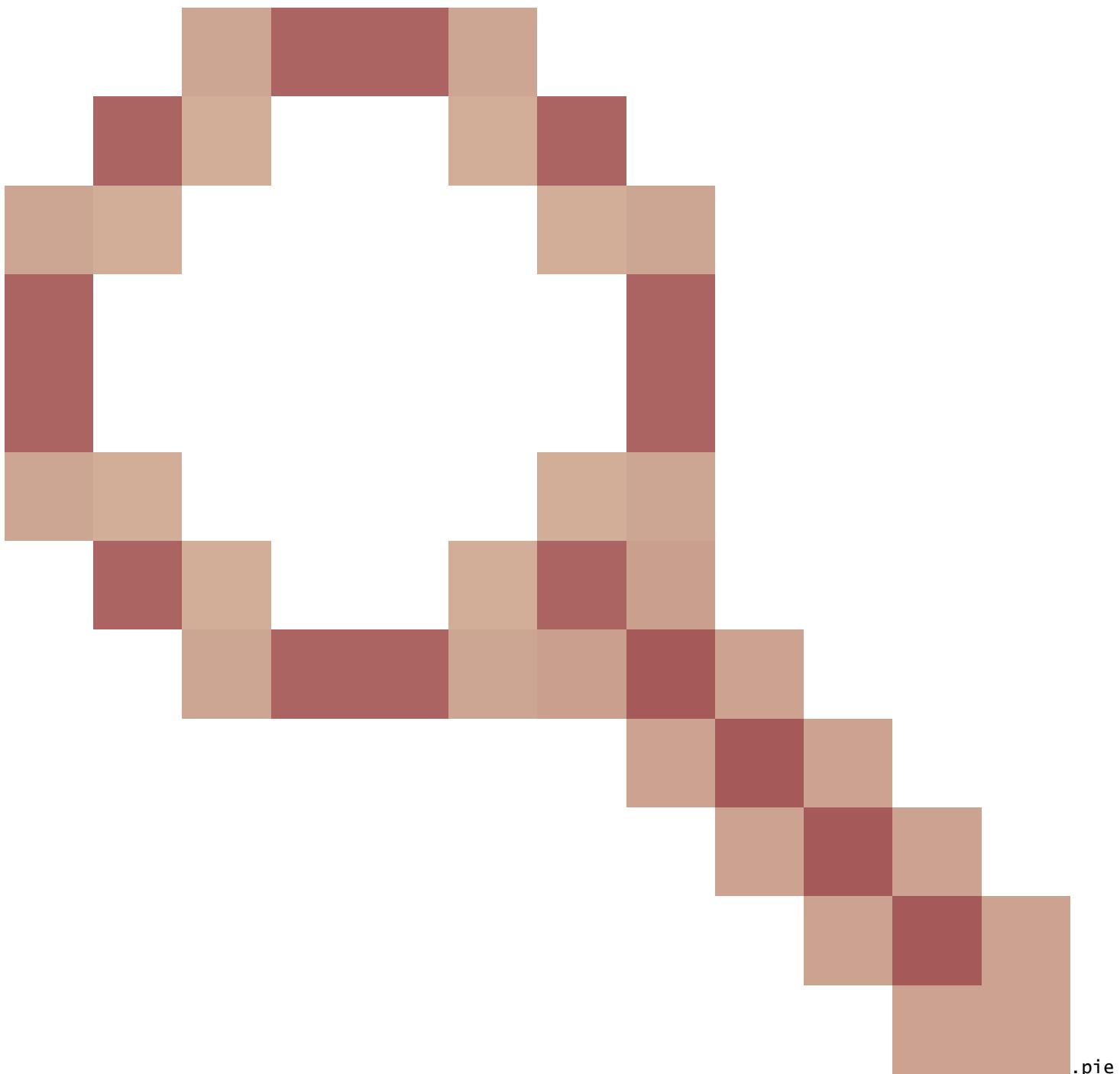
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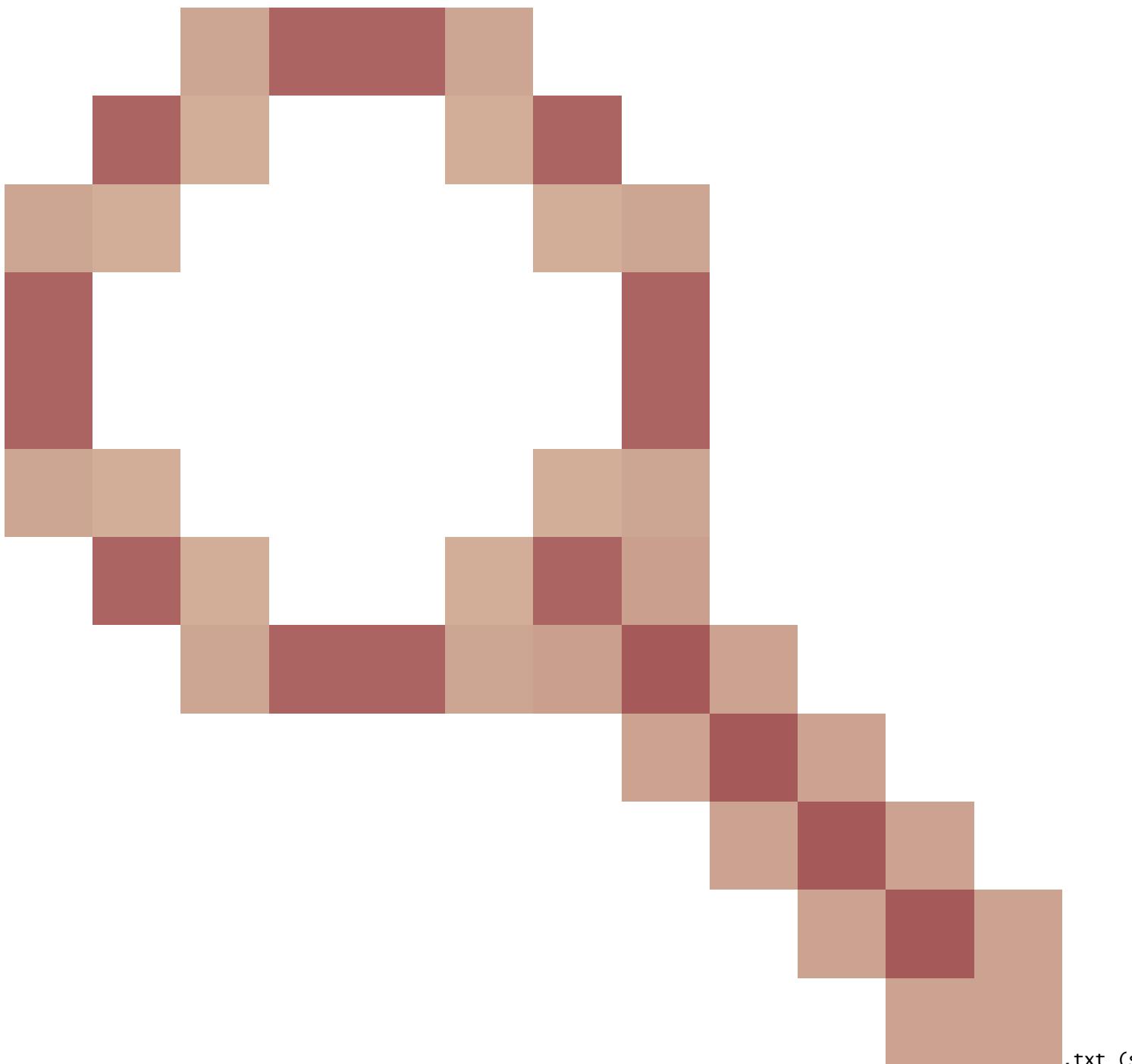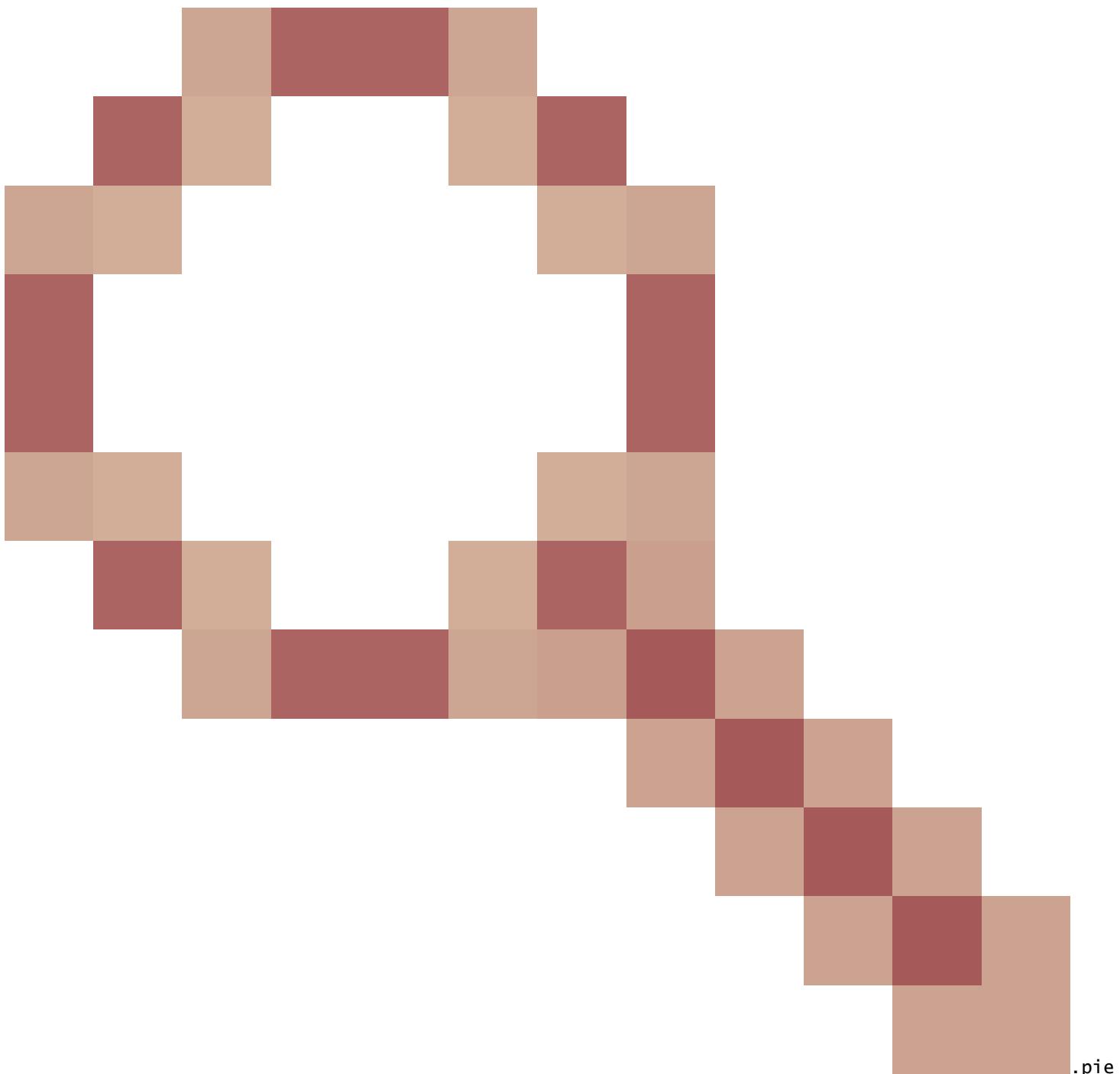
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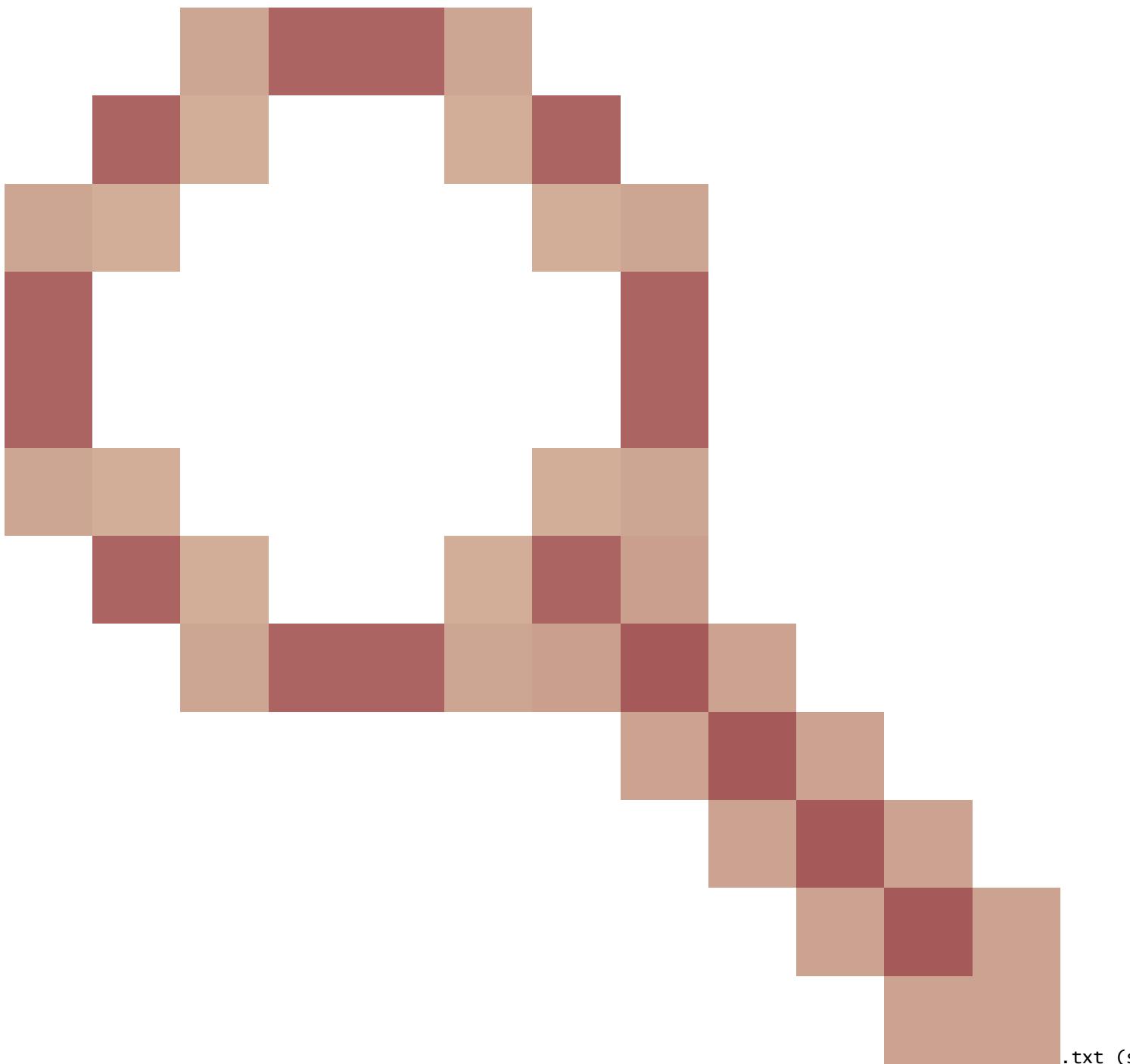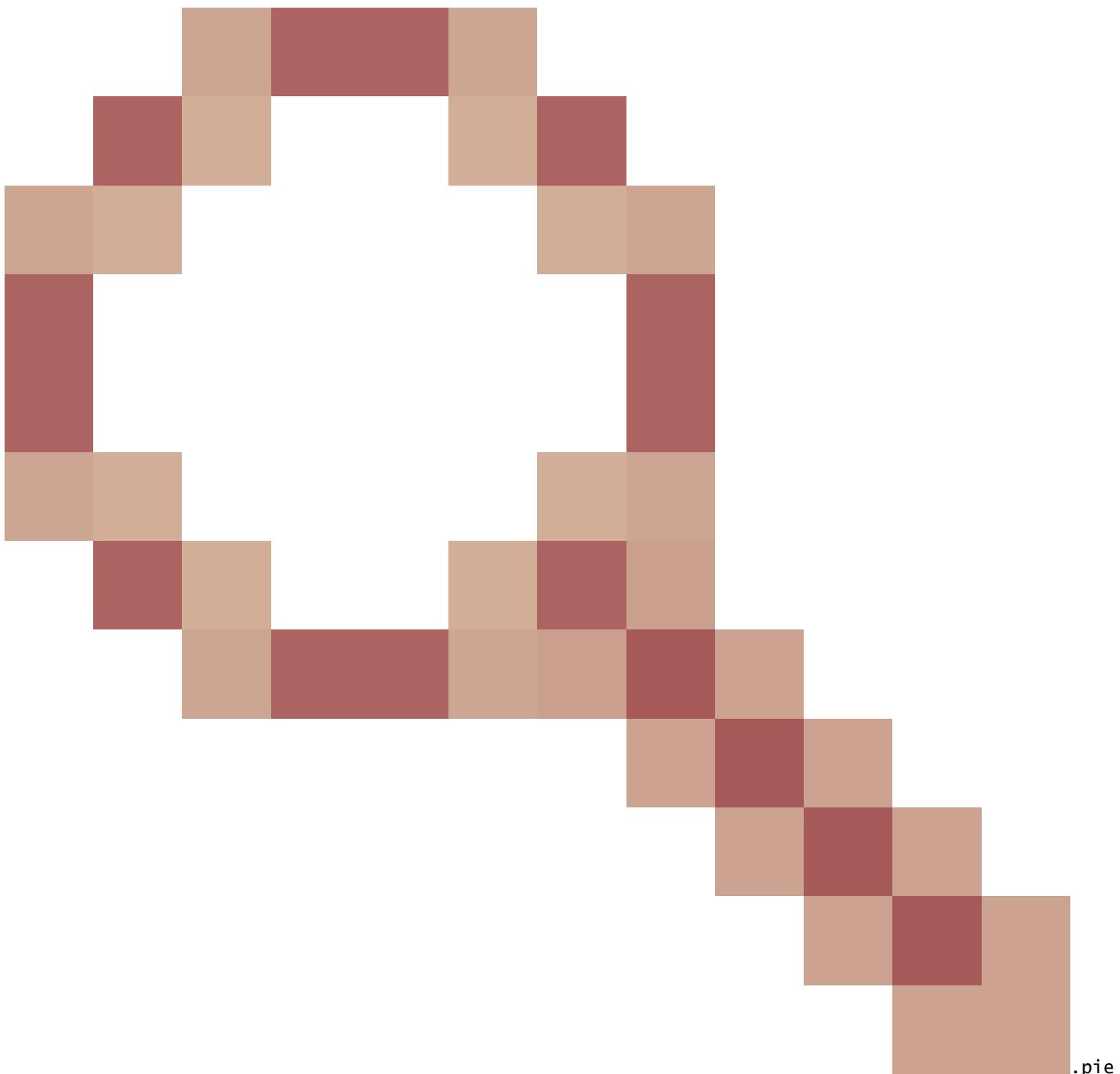
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Info: asr9k-p-4.2.1.CSCua04907

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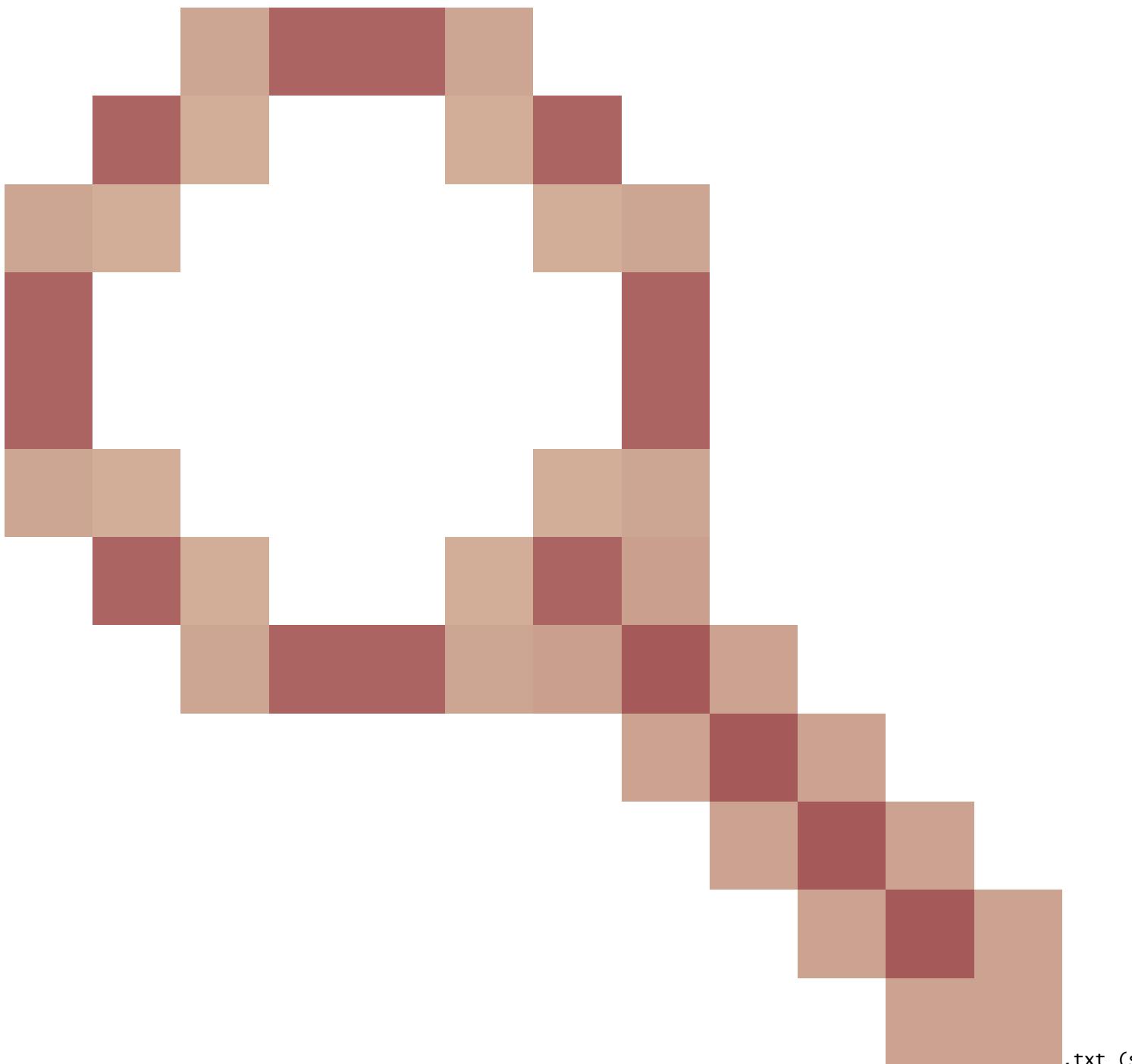
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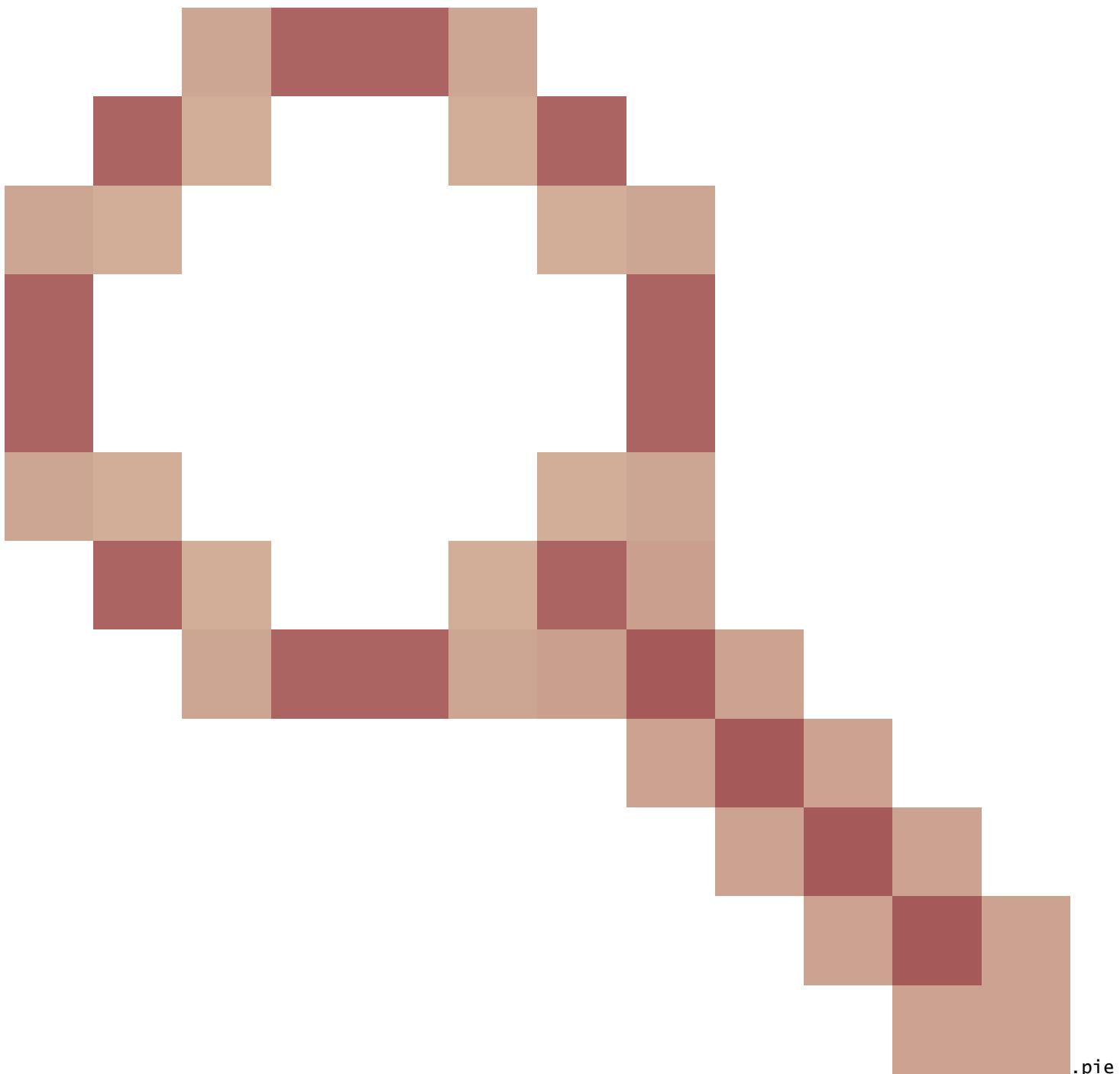
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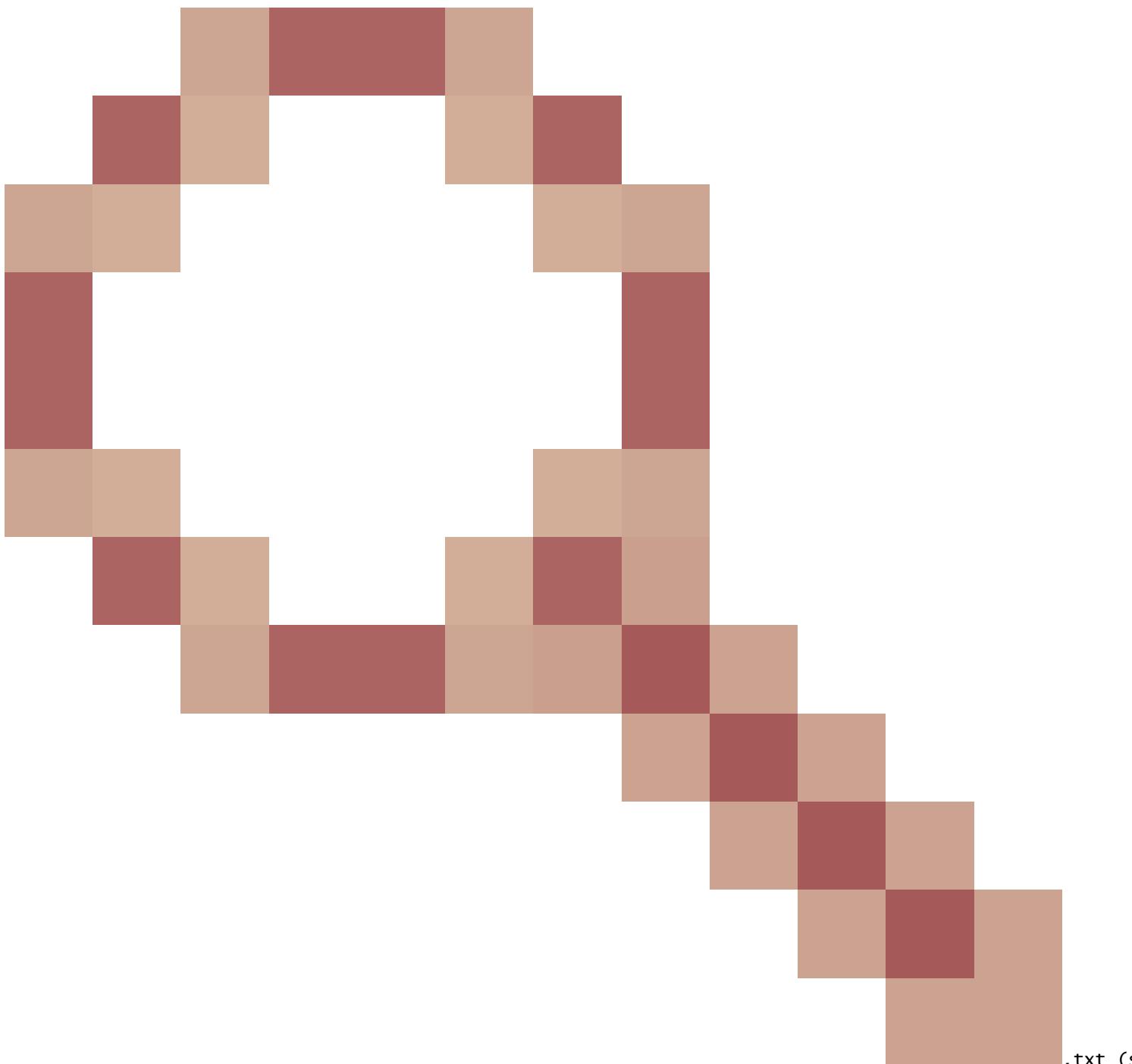
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Info: asr9k-p-4.2.1.CSCua16764
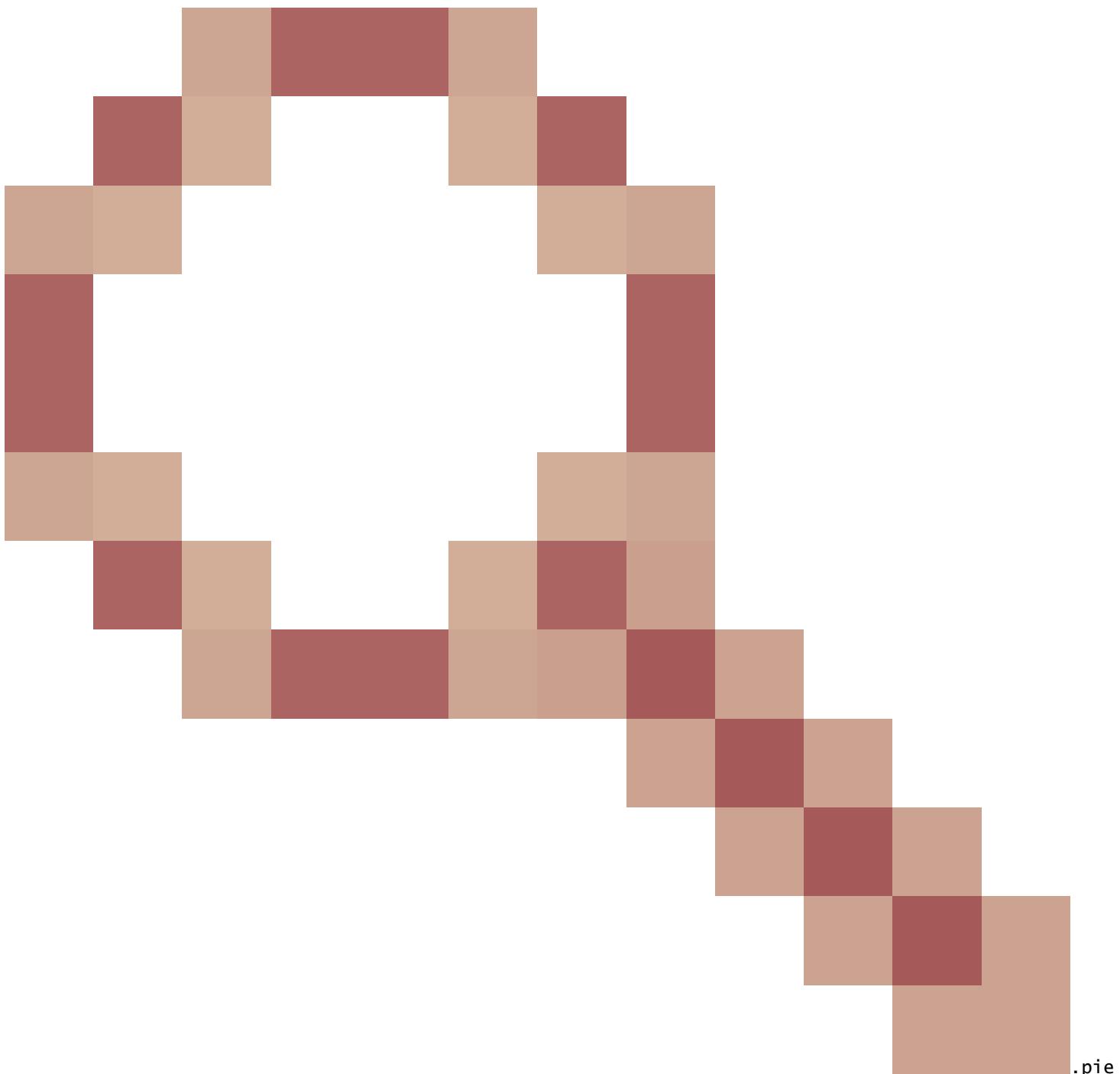
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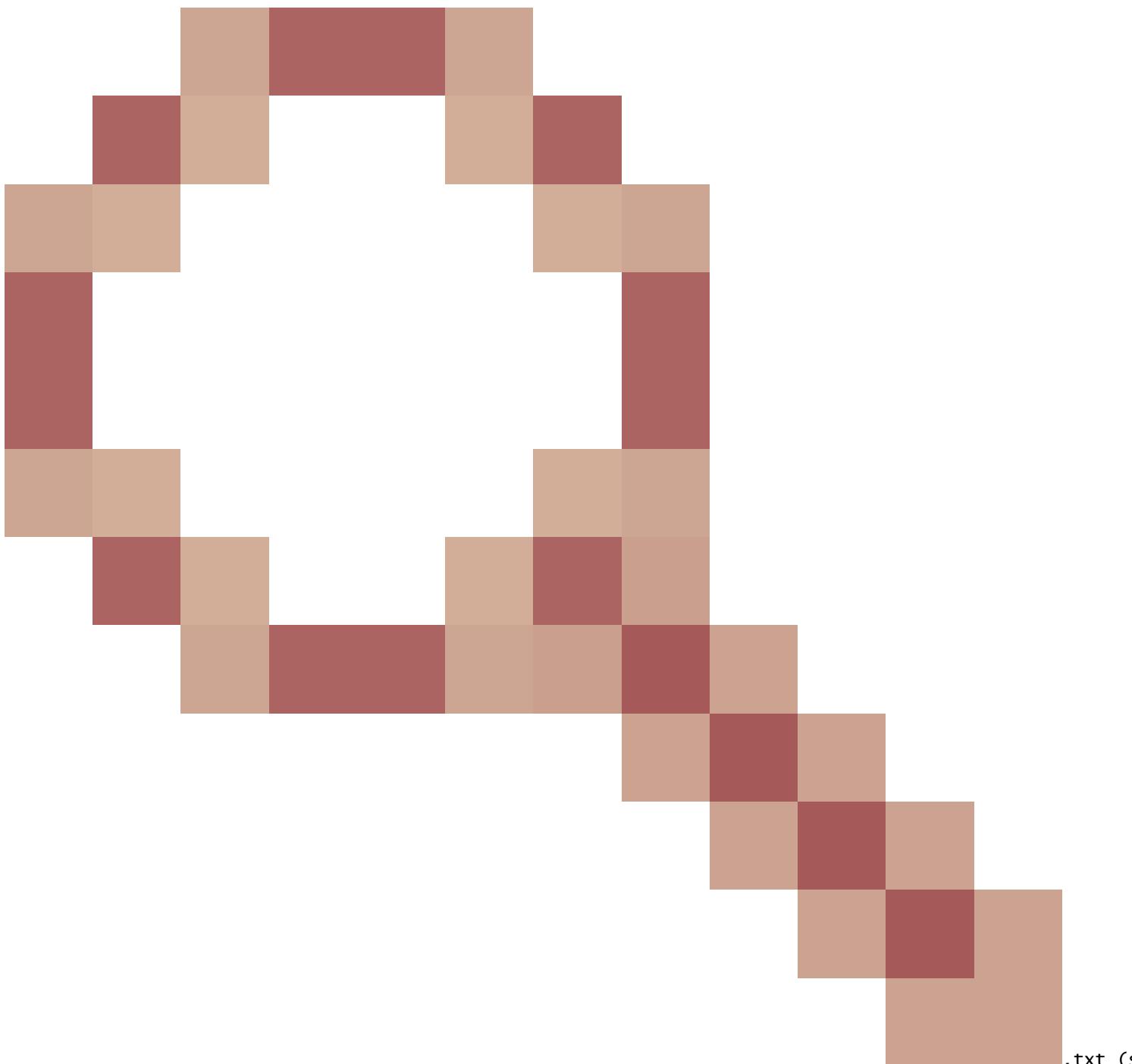
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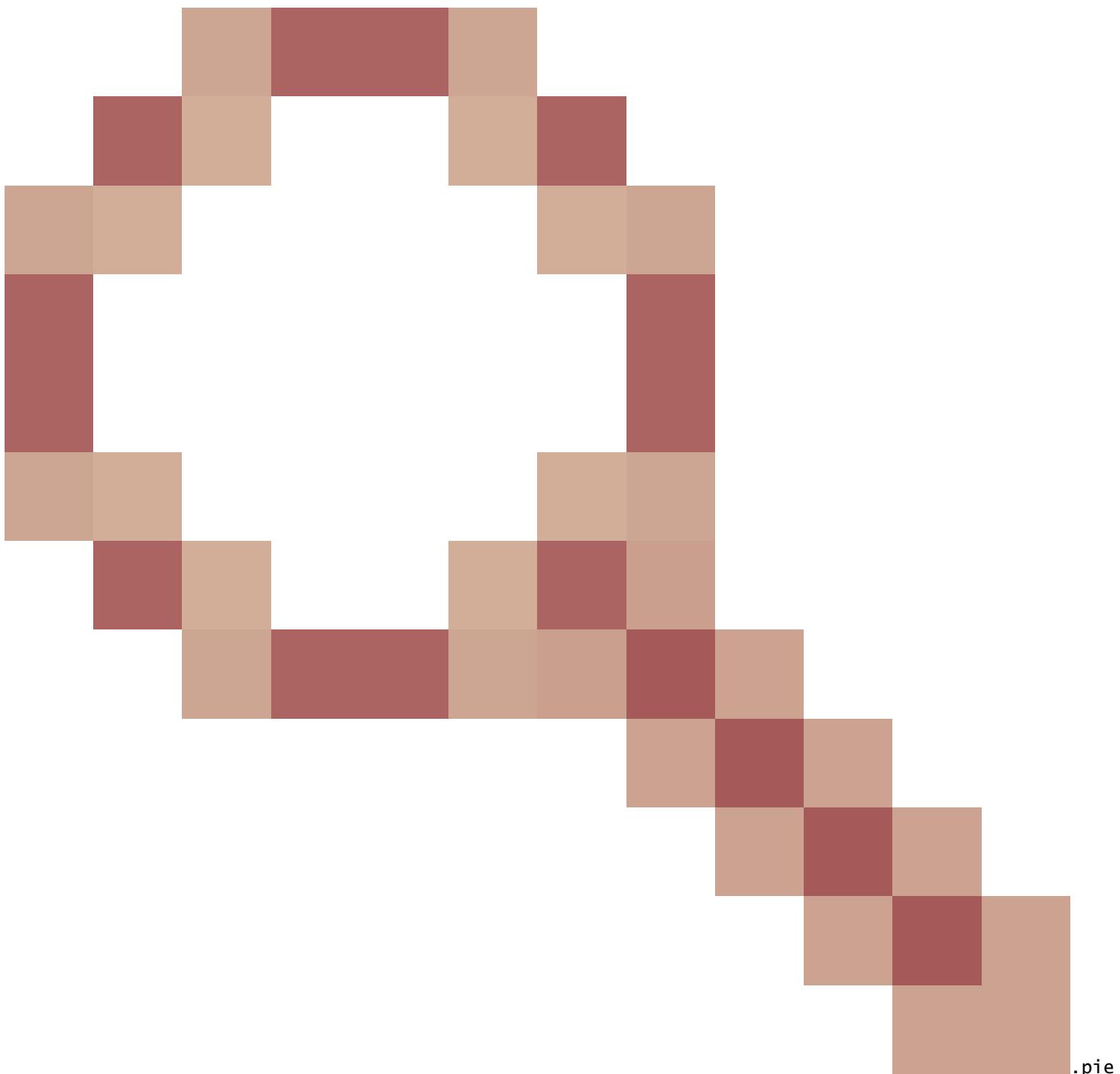
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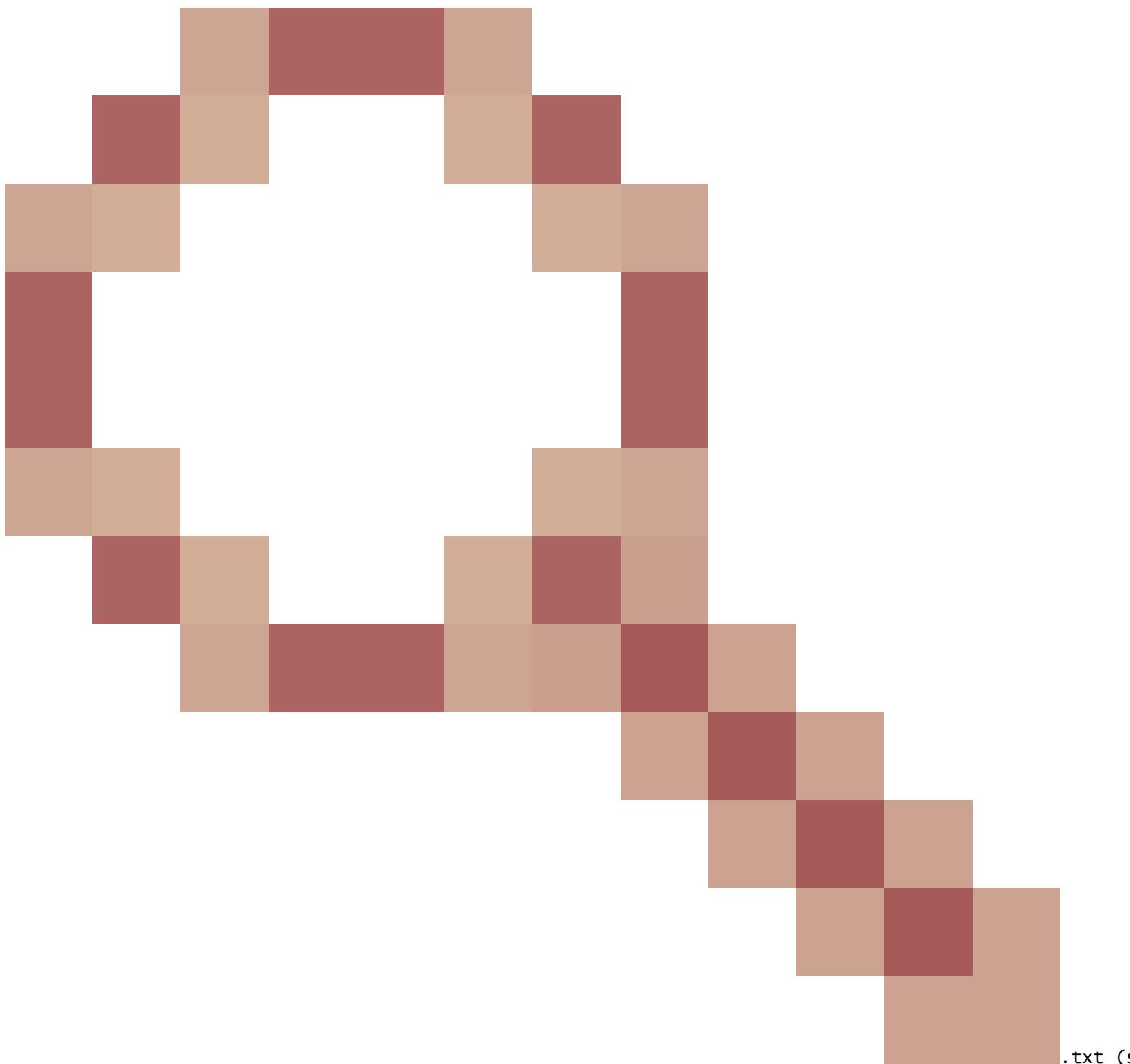
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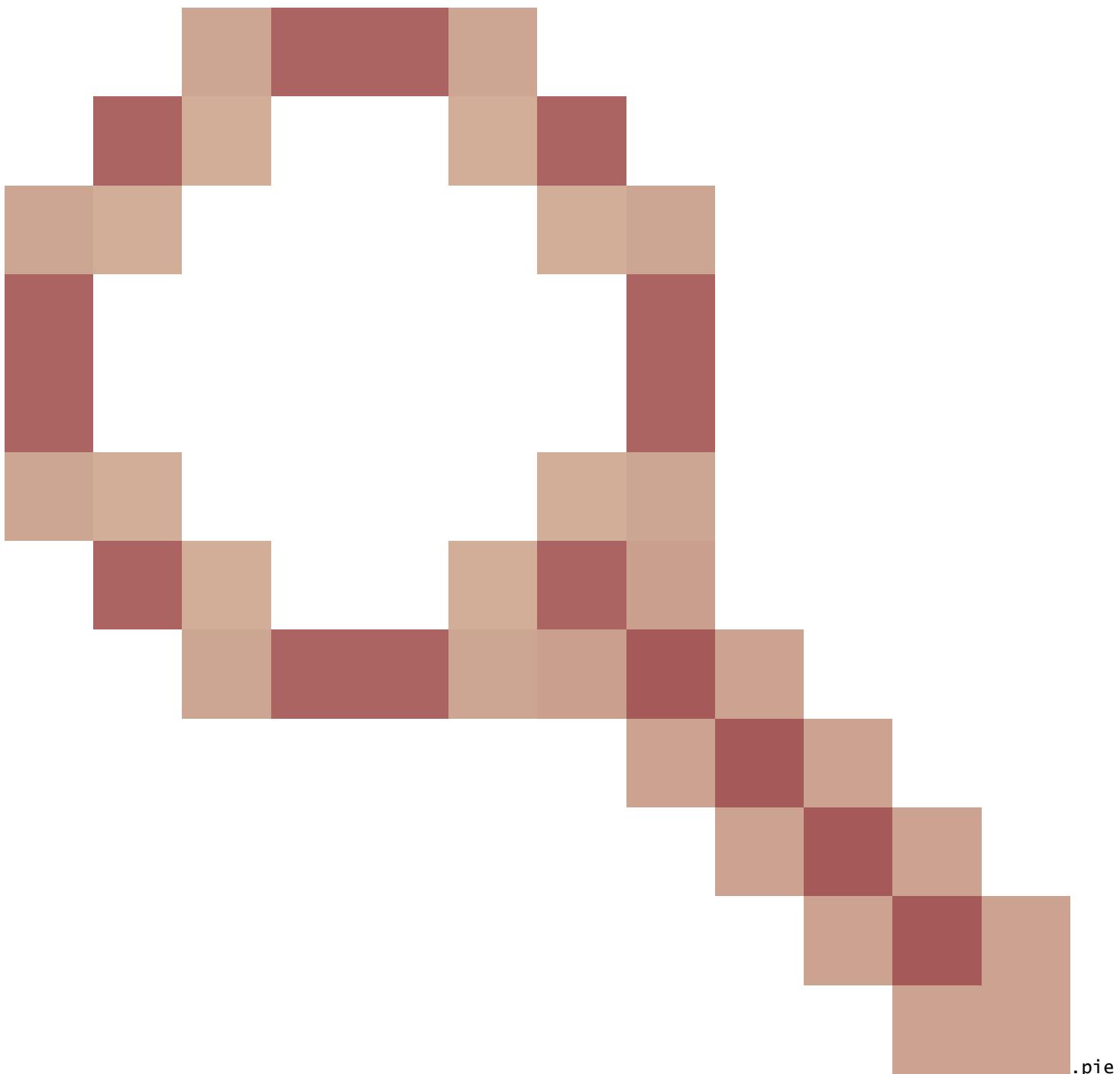
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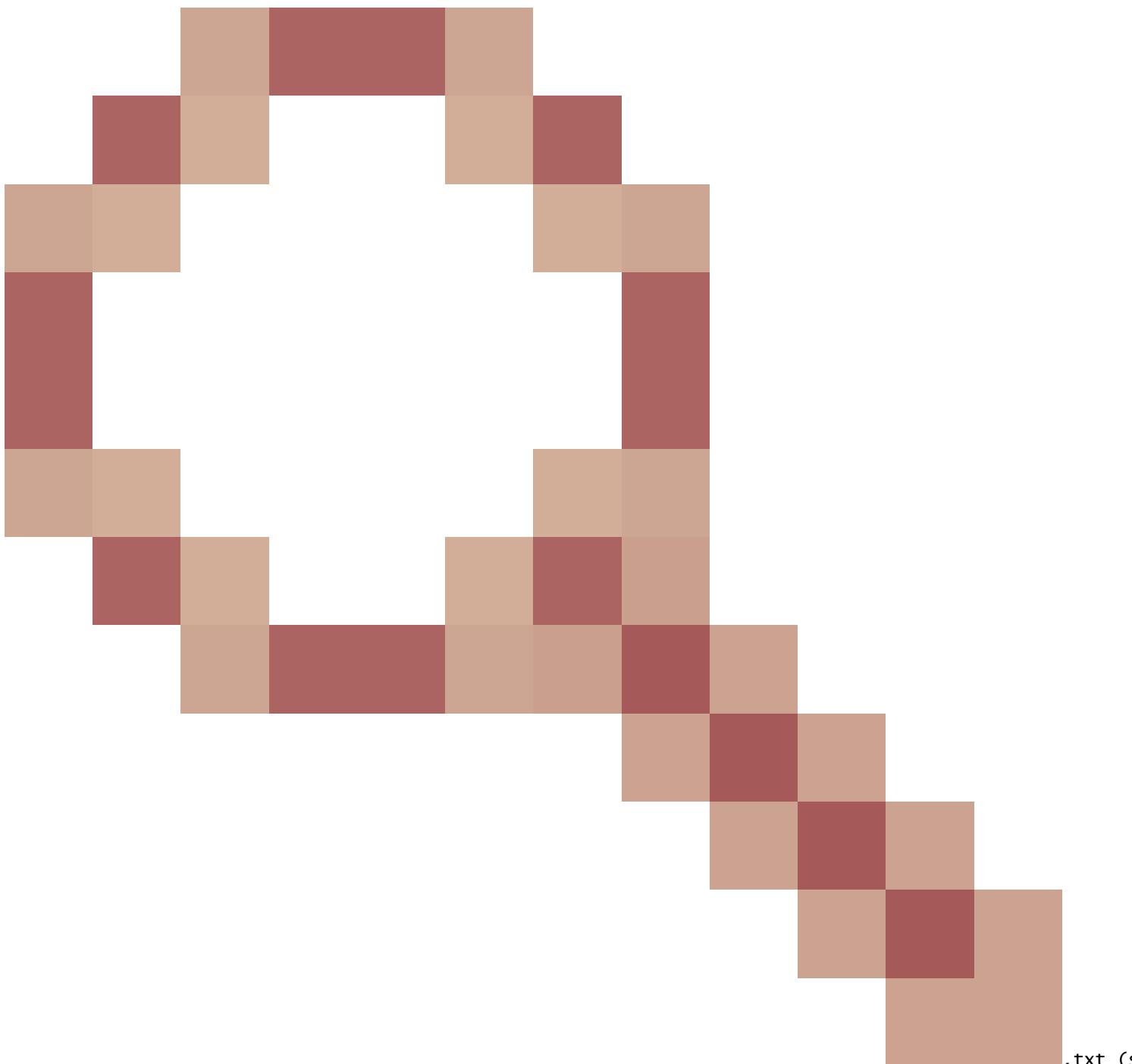
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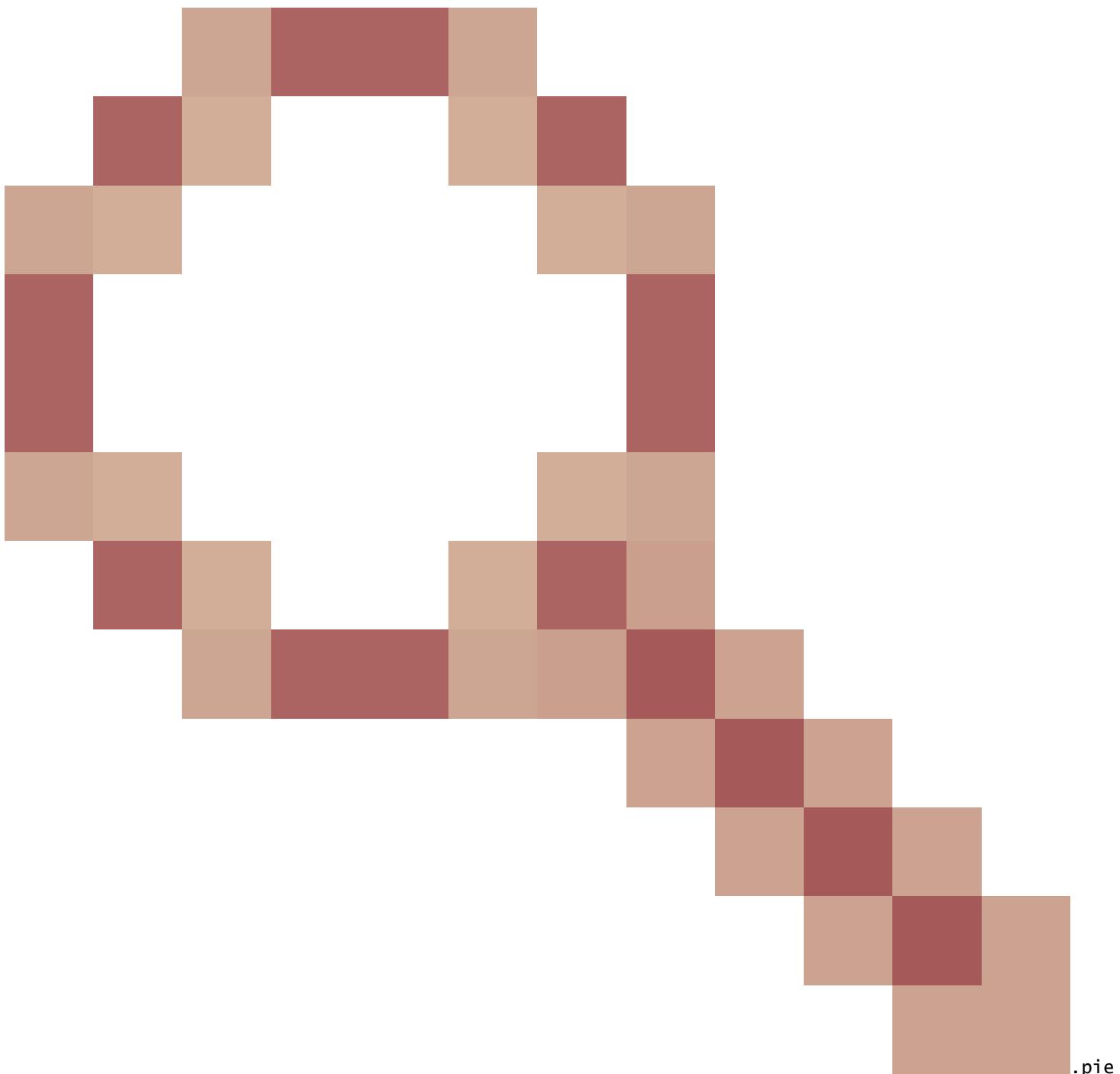
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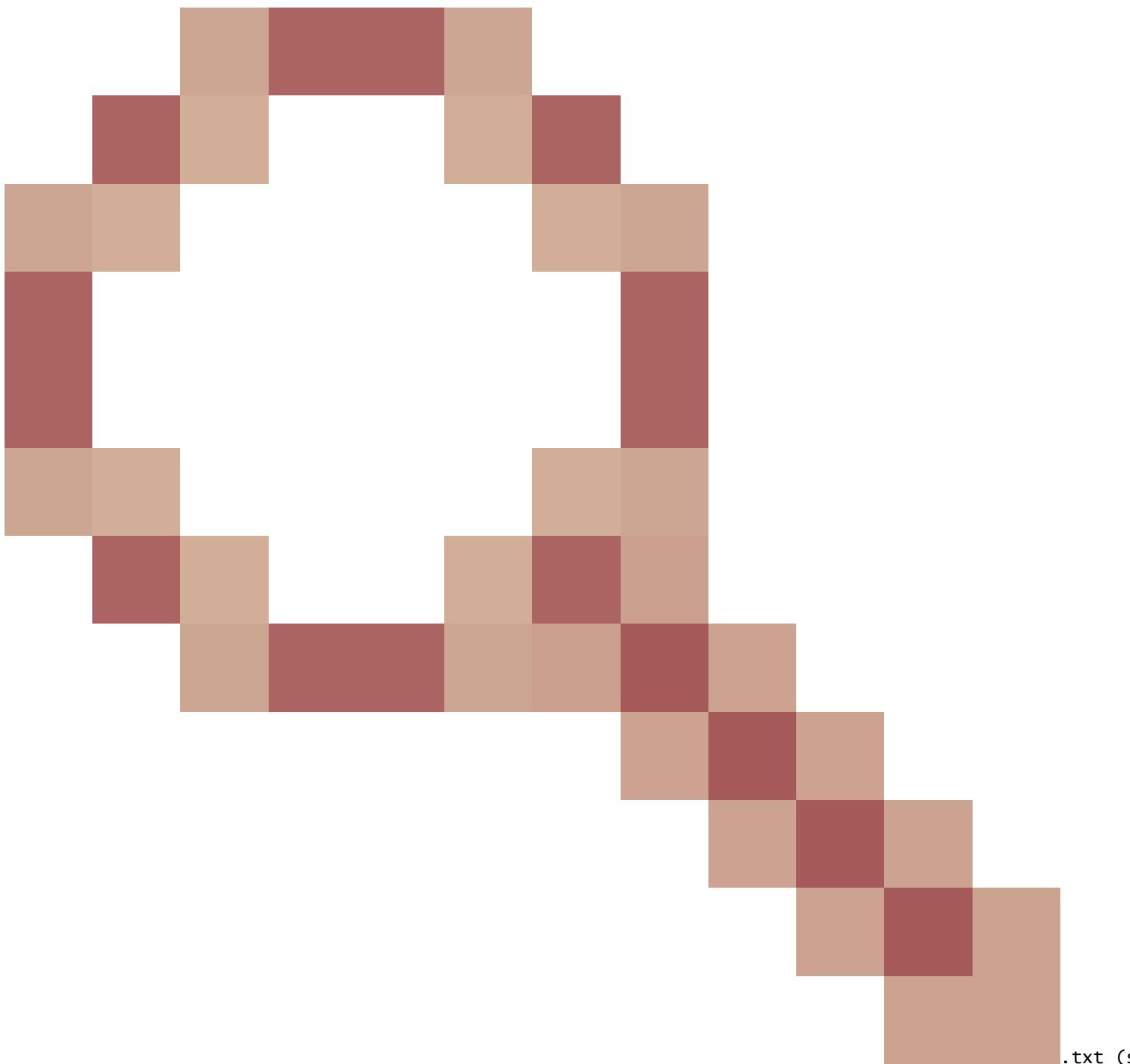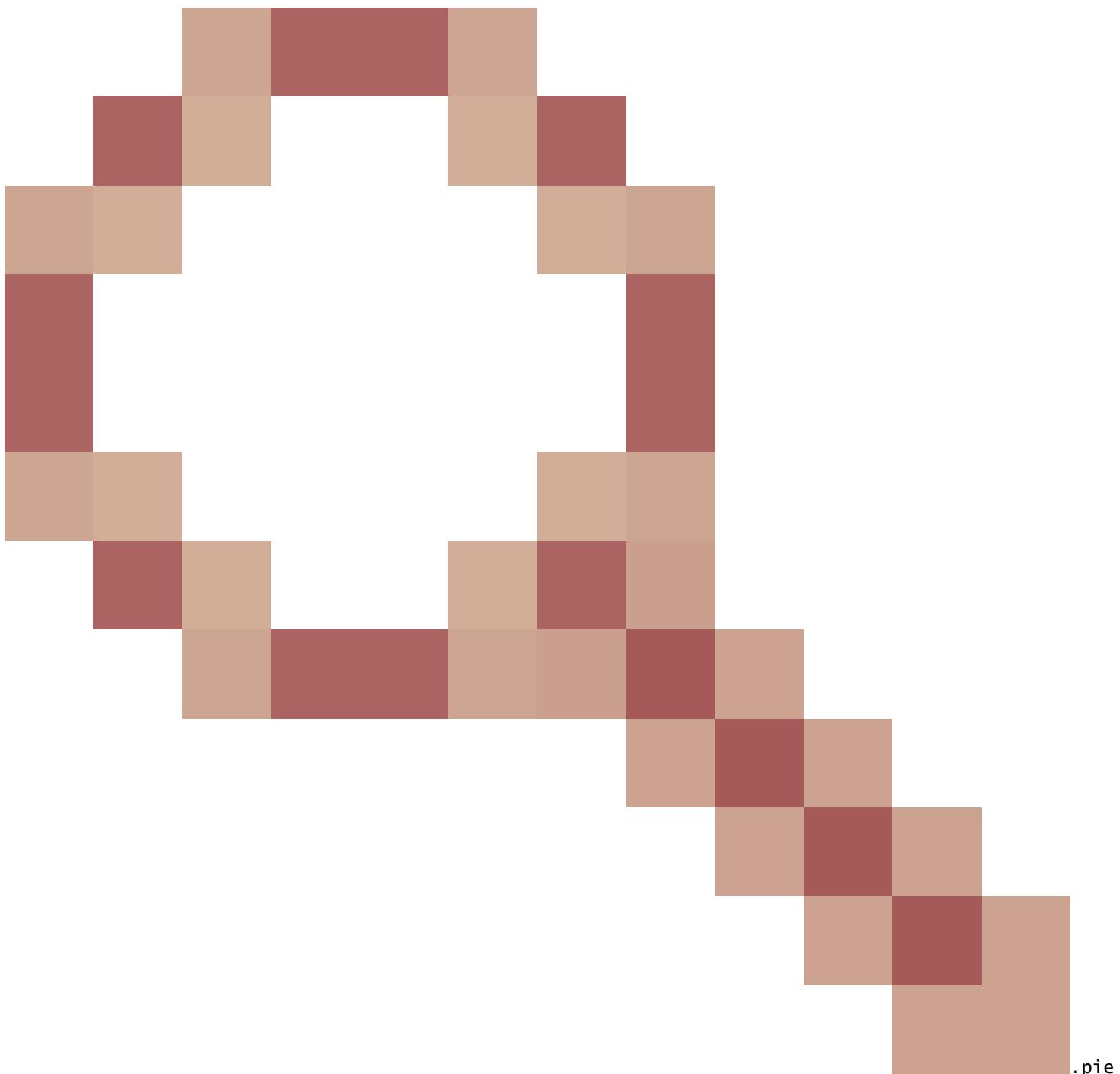
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Info: asr9k-p-4.2.1.CSCua47910

Info: asr9k-p-4.2.1.CSCua47910.pie
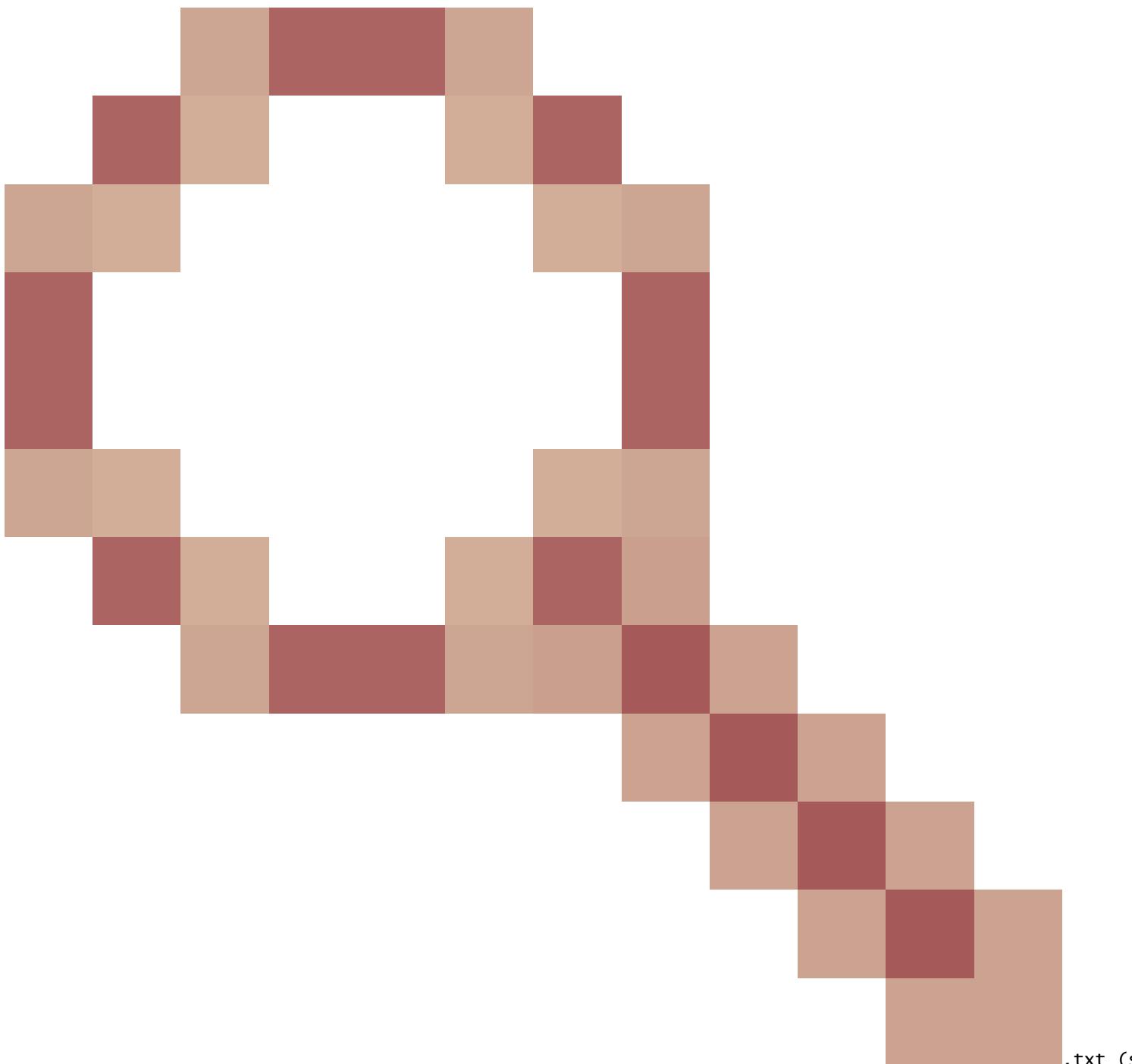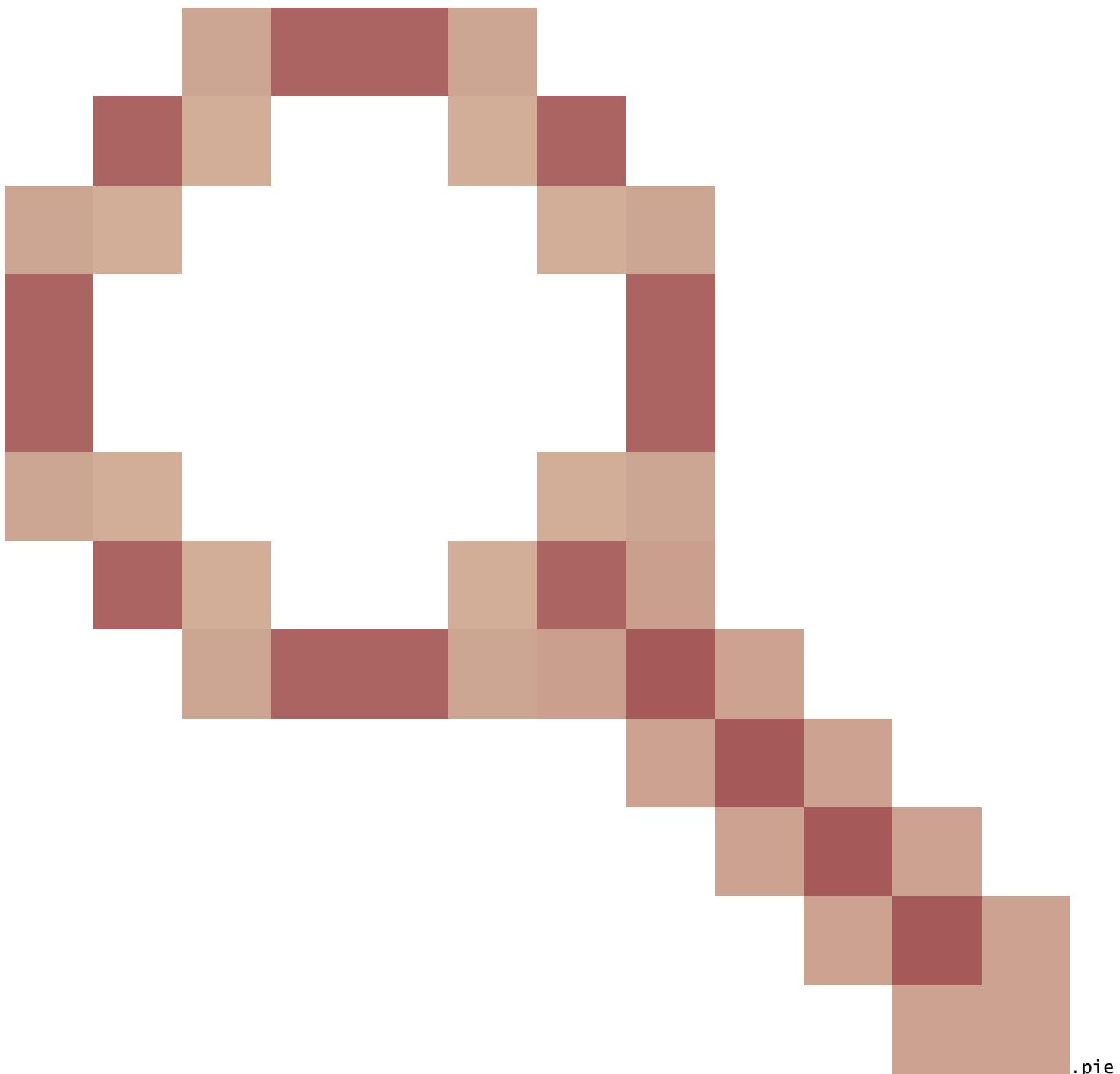
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Info: asr9k-p-4.2.1.[CSCua48549](https://tools.cisco.com/bugsearch/bug/CSCua48549)

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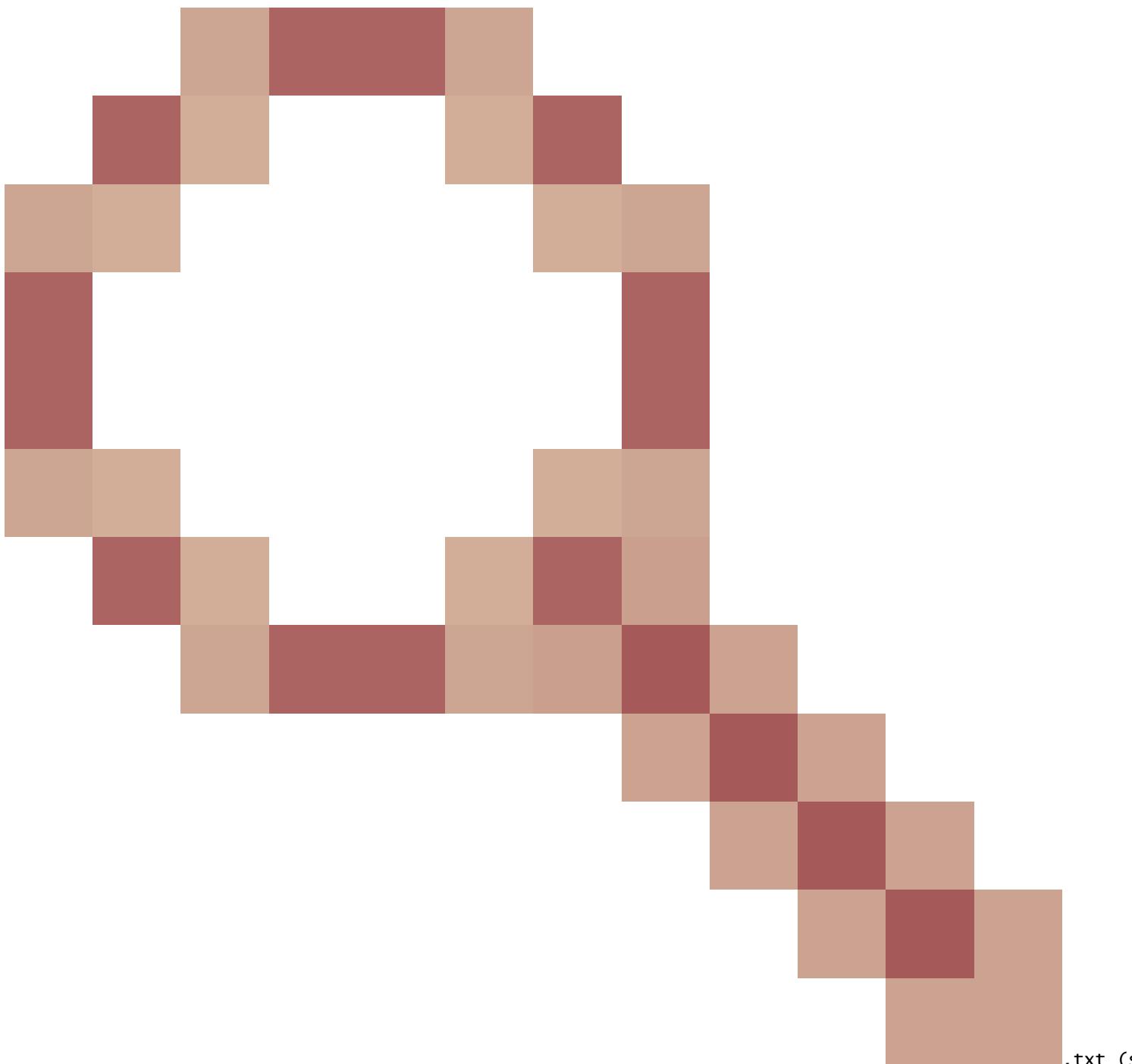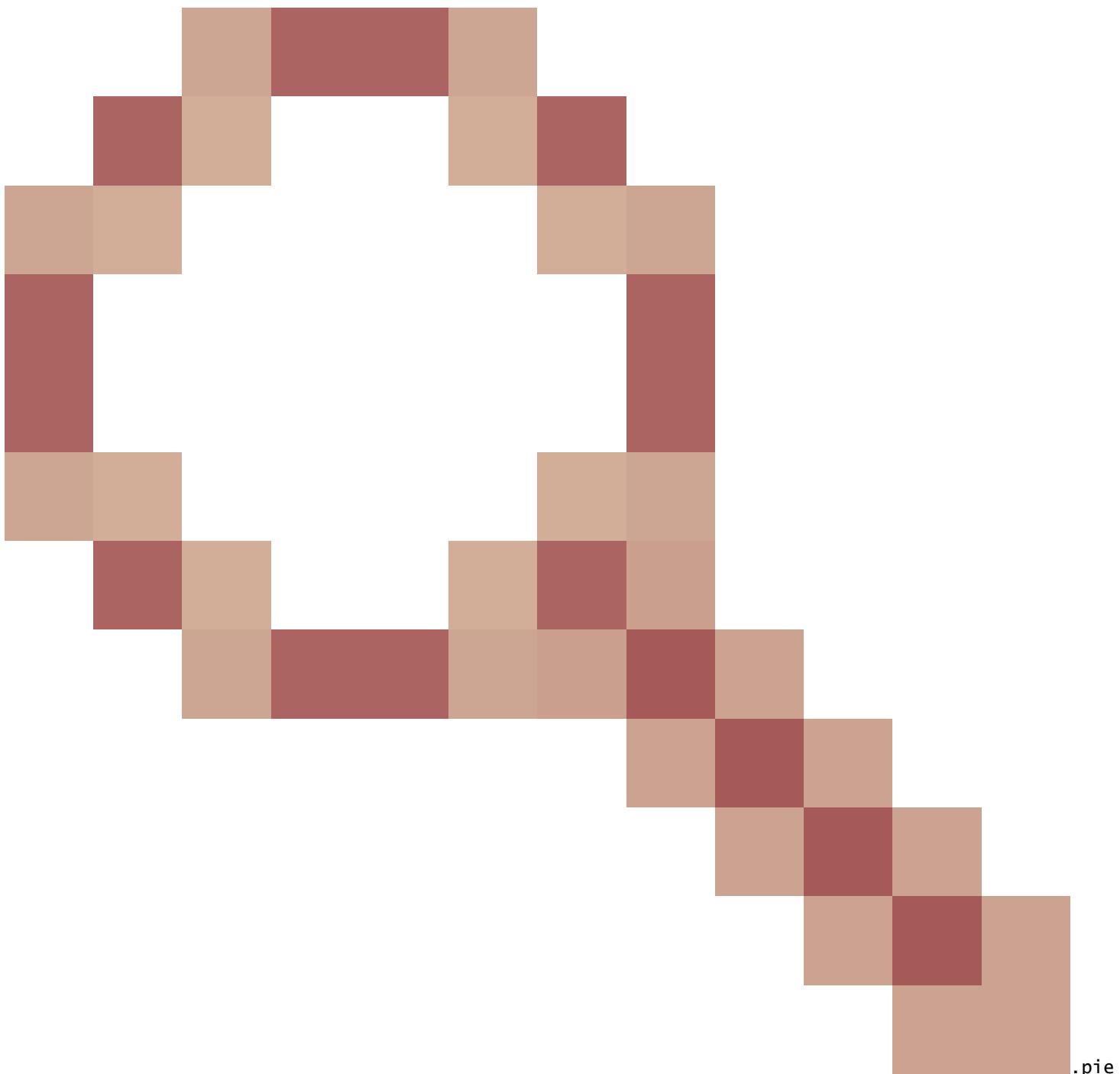
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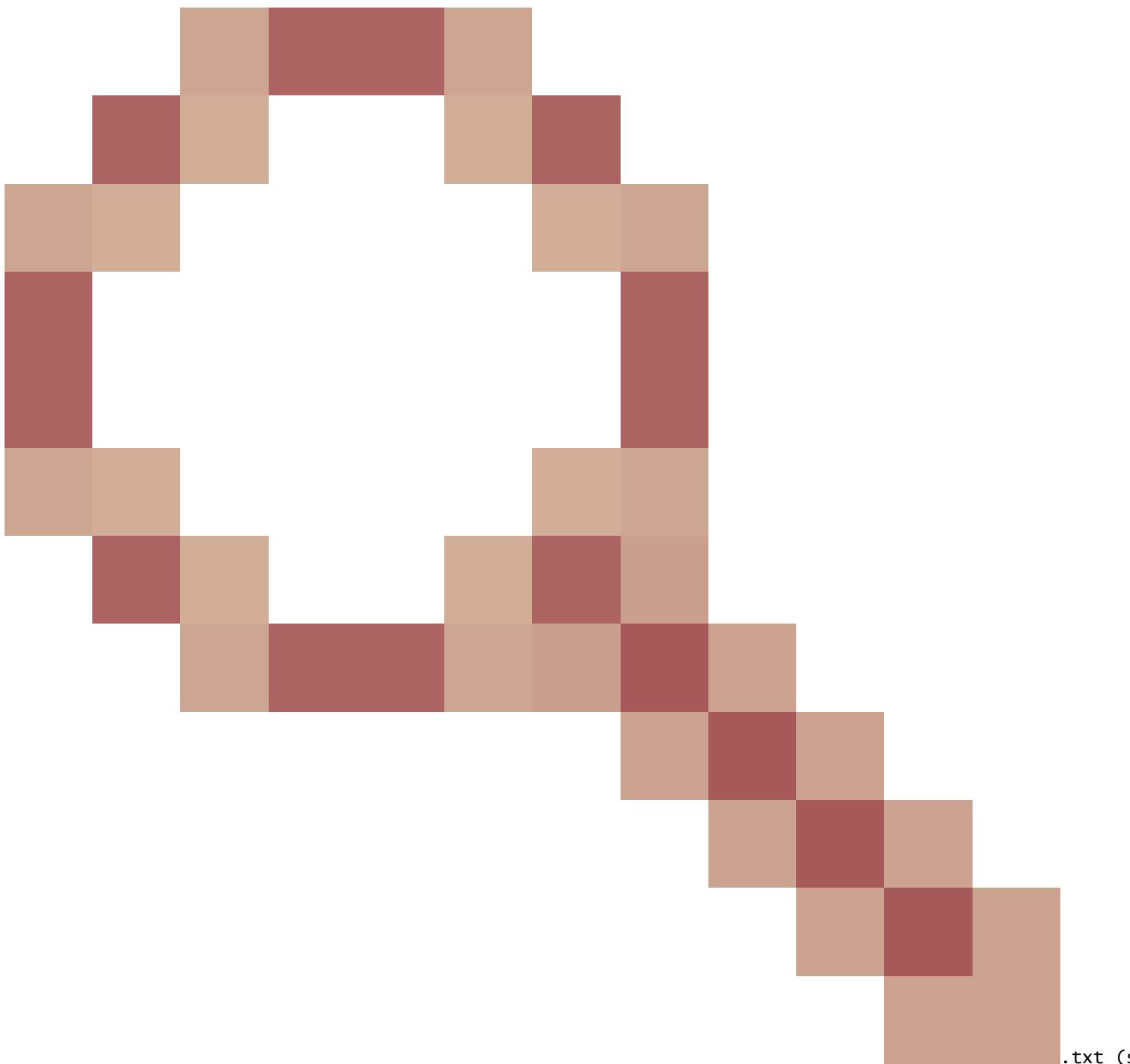
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Info: asr9k-p-4.2.1.CSCua69819
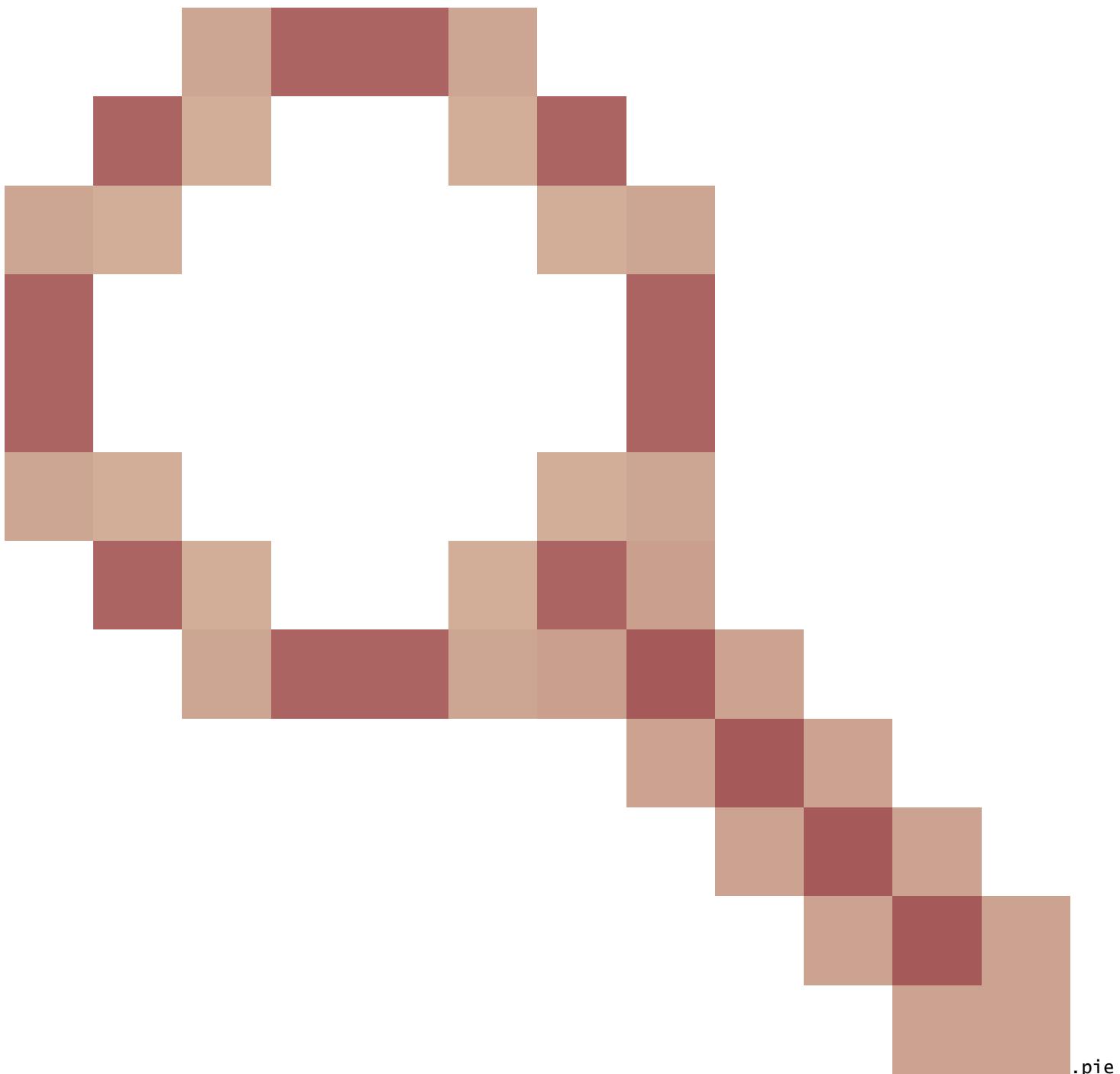
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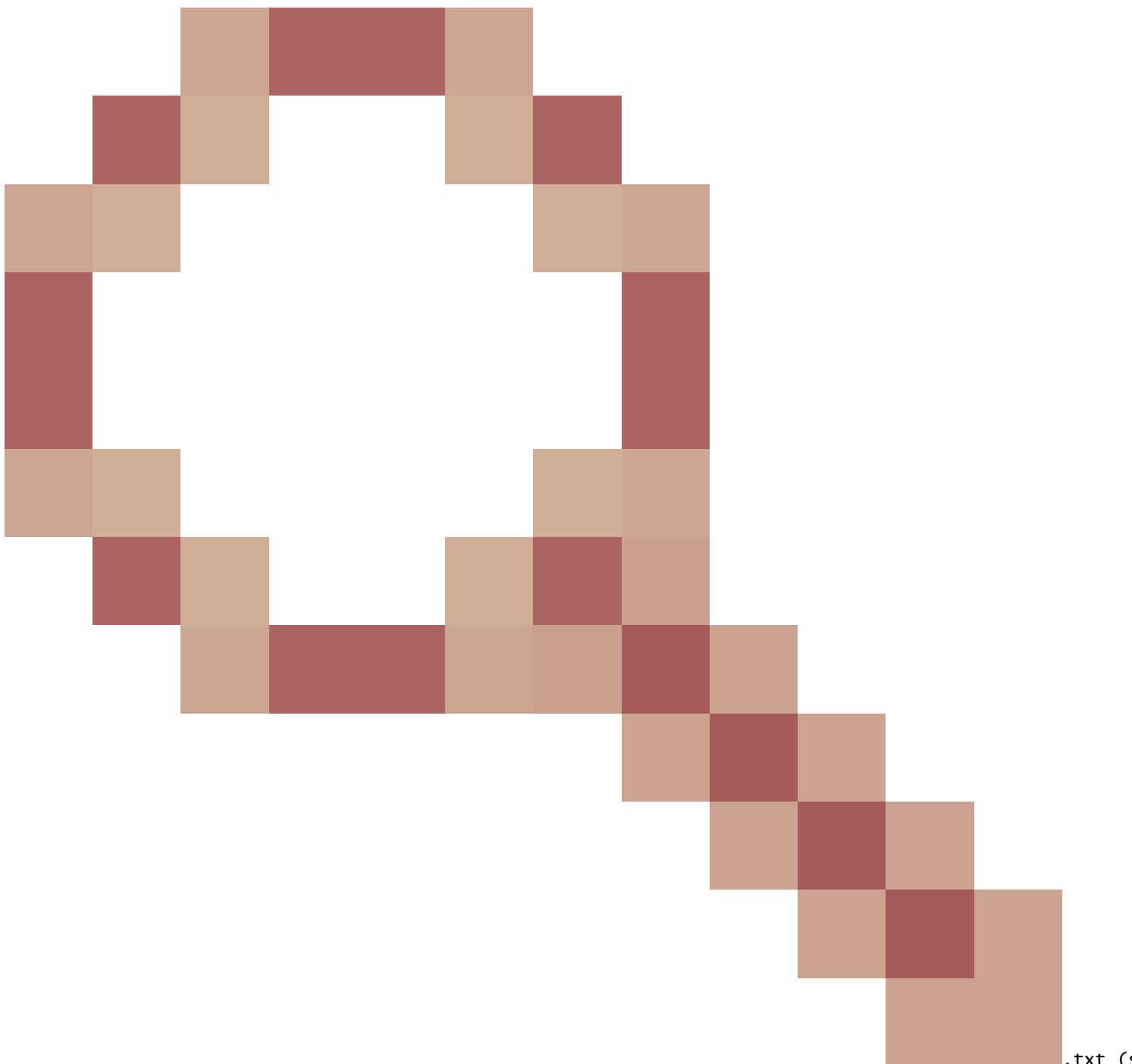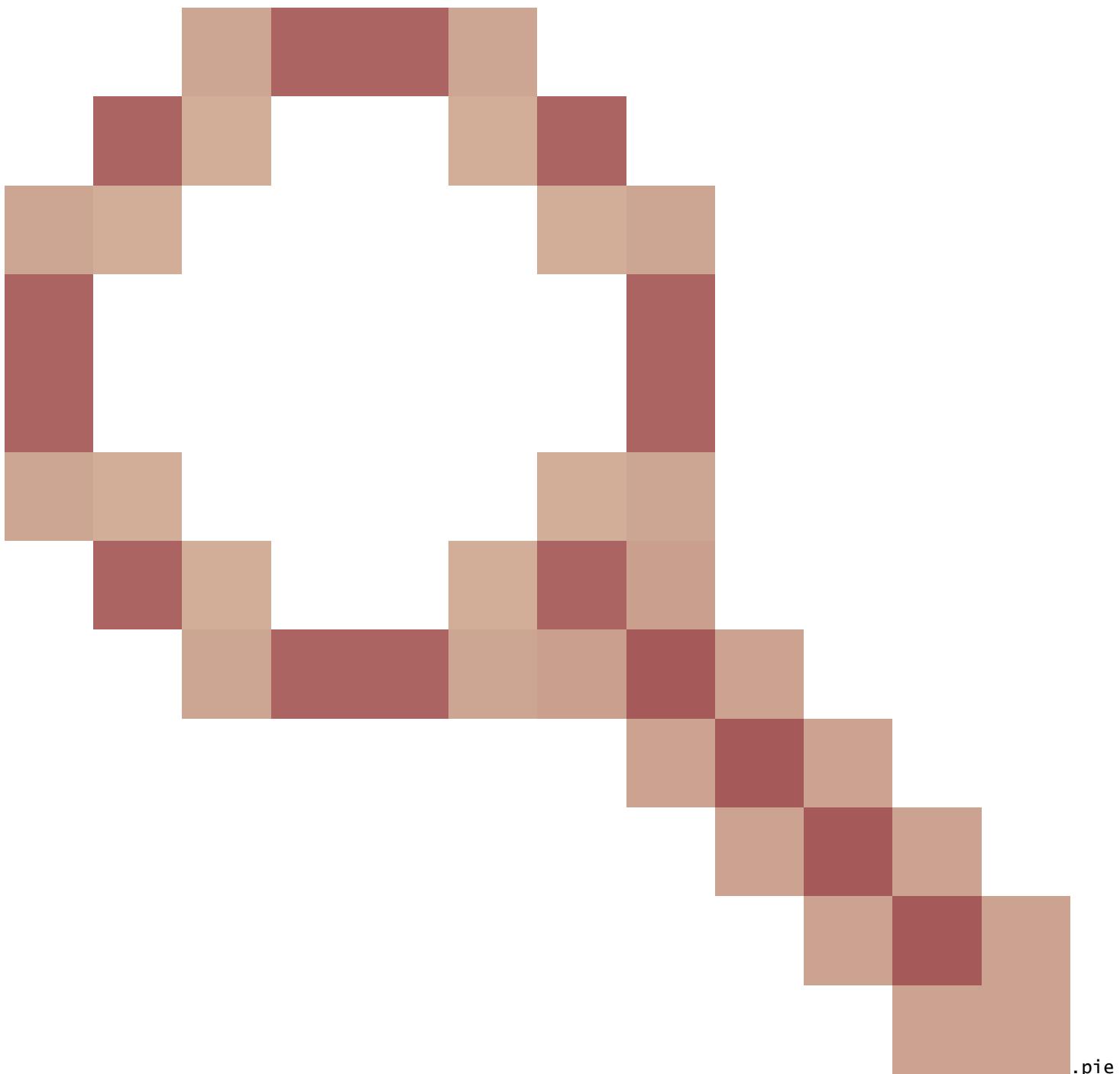
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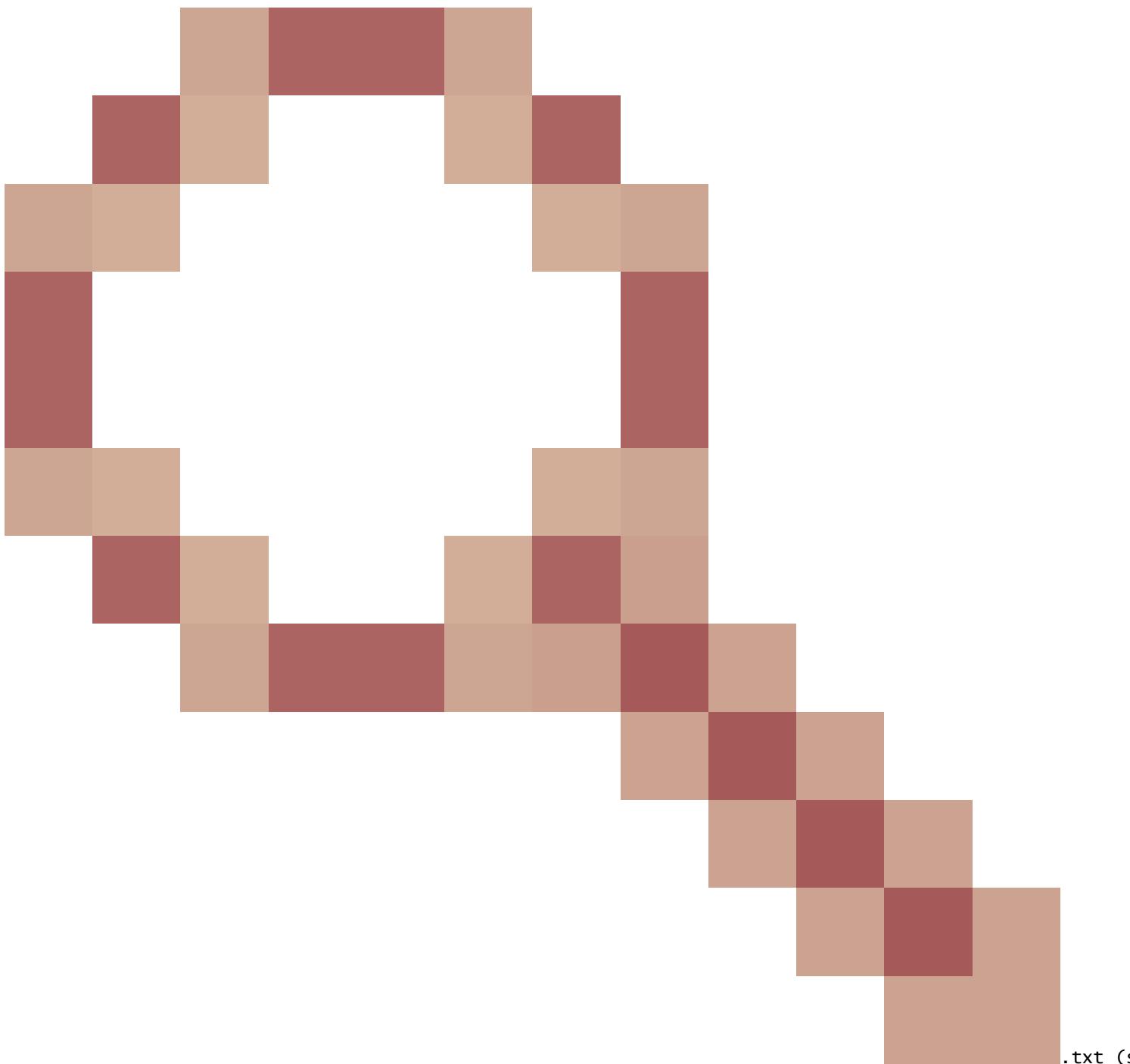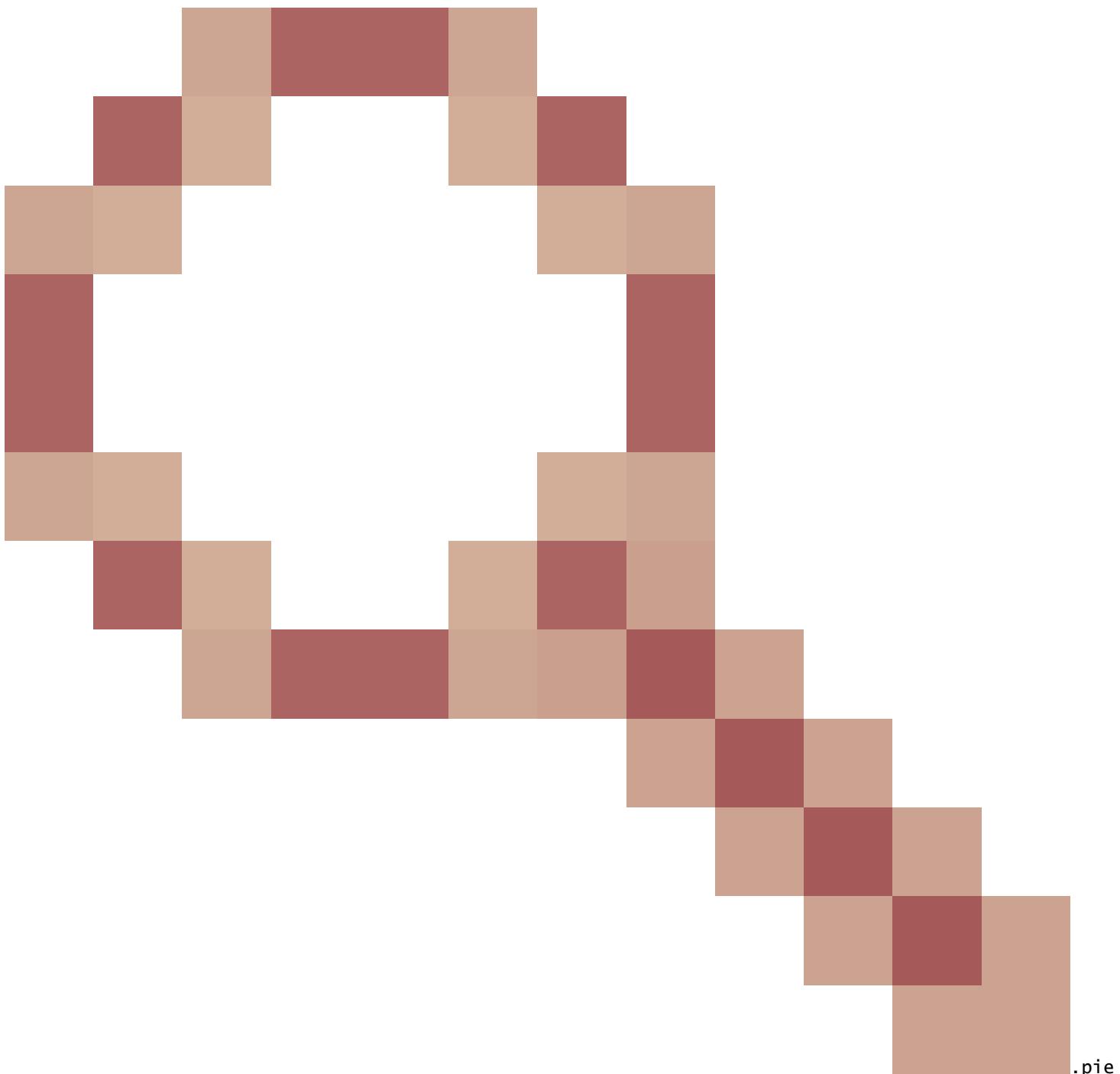
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Info: asr9k-p-4.2.1.CSCua74062
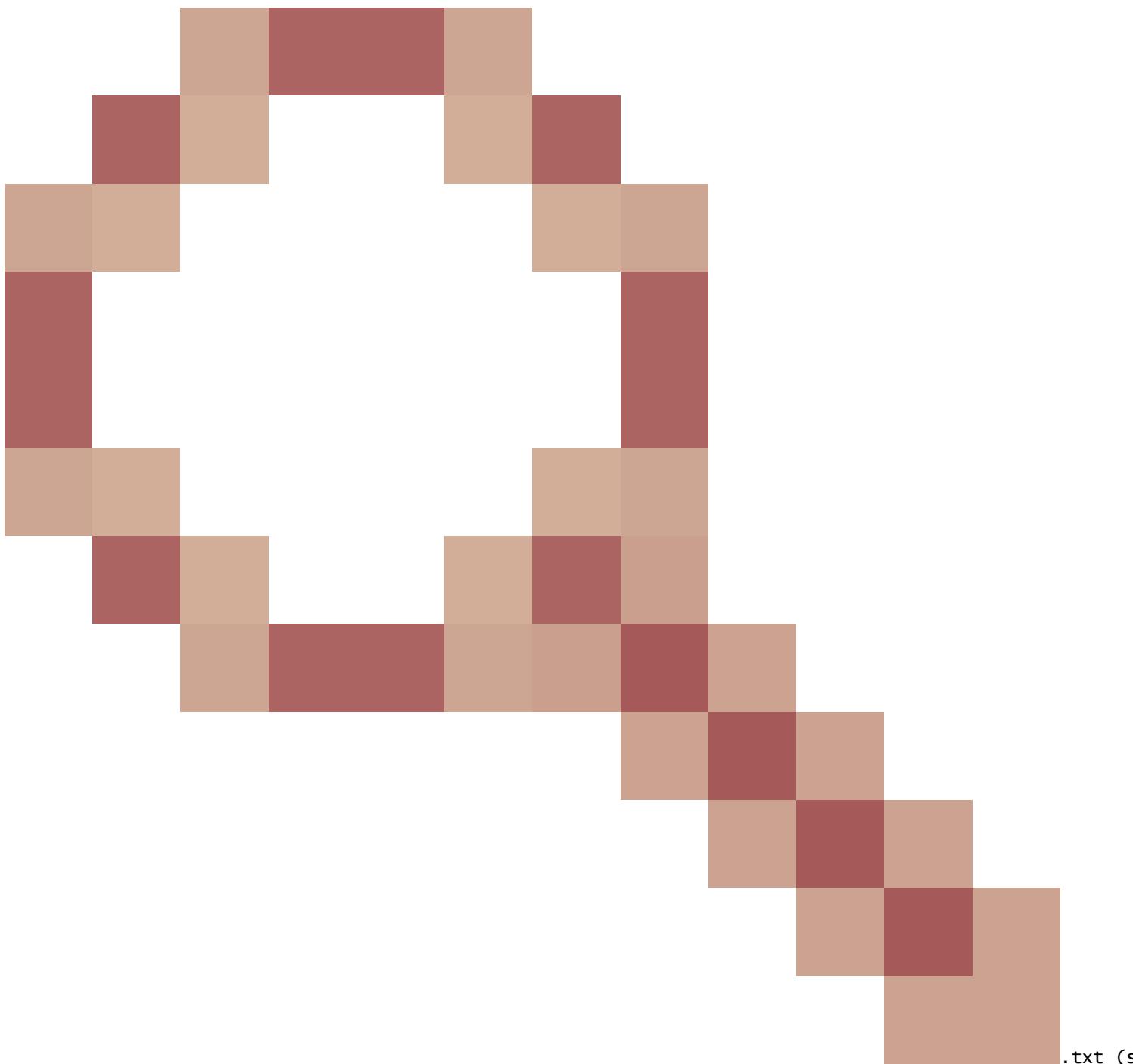
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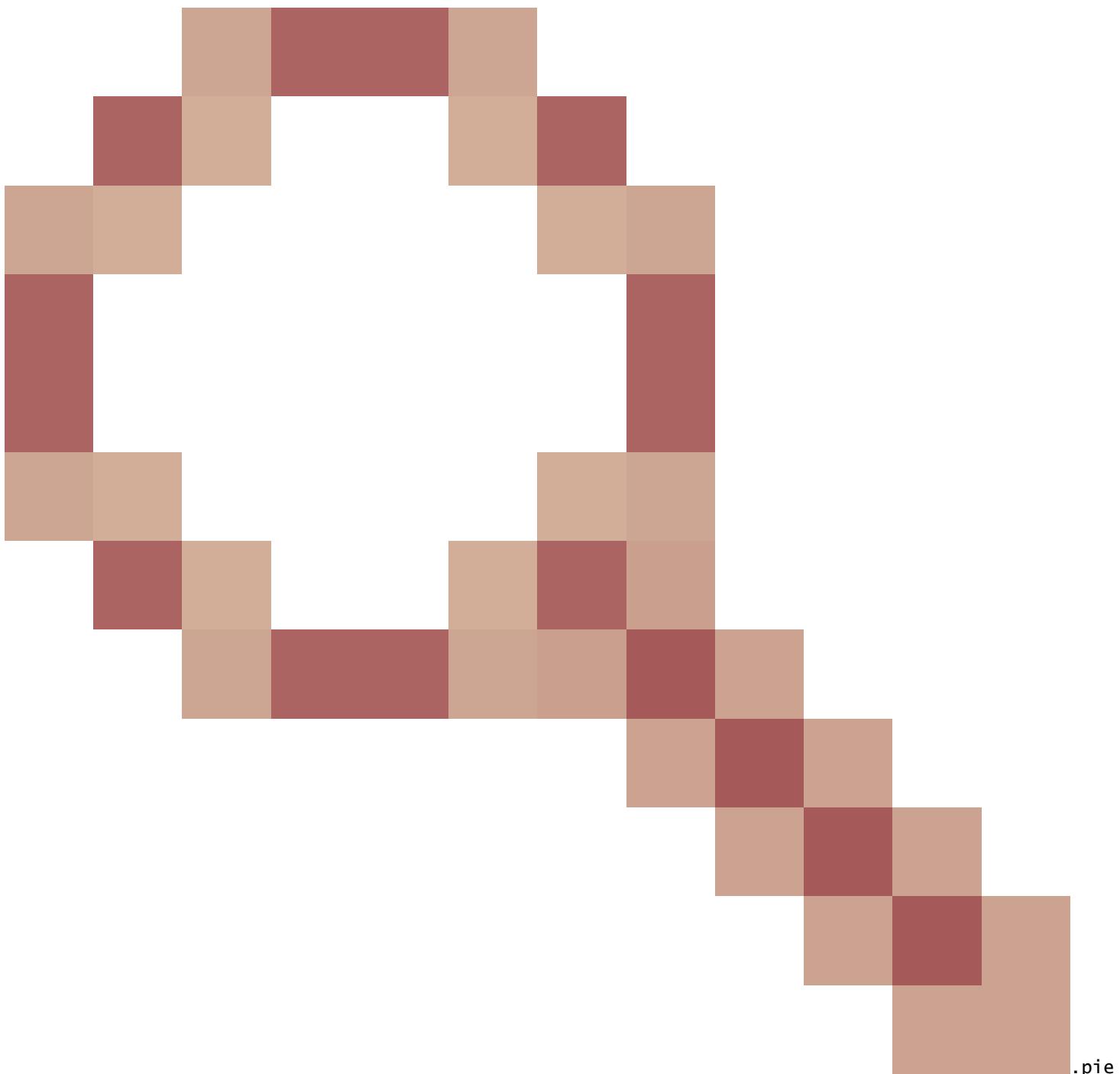
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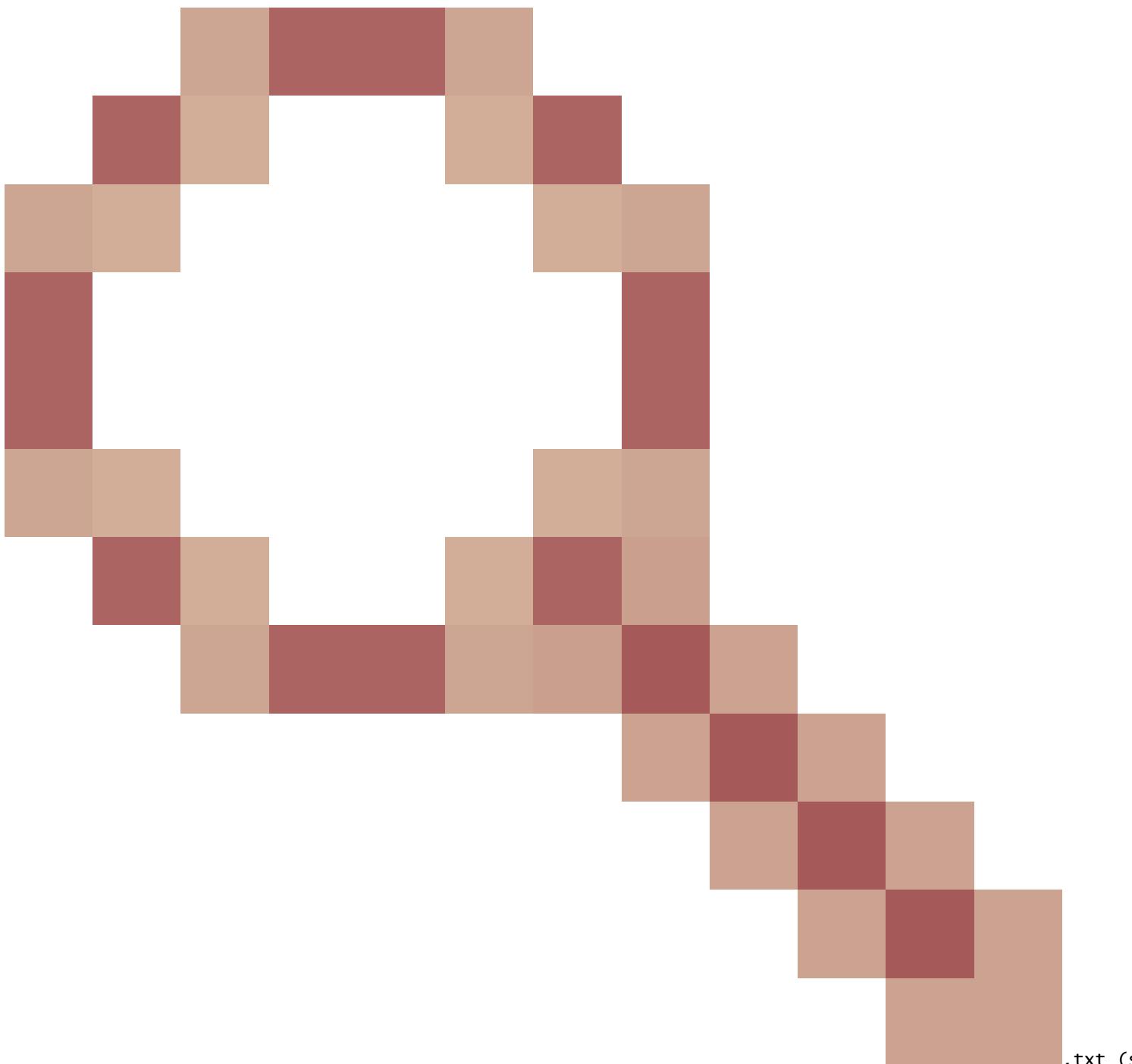
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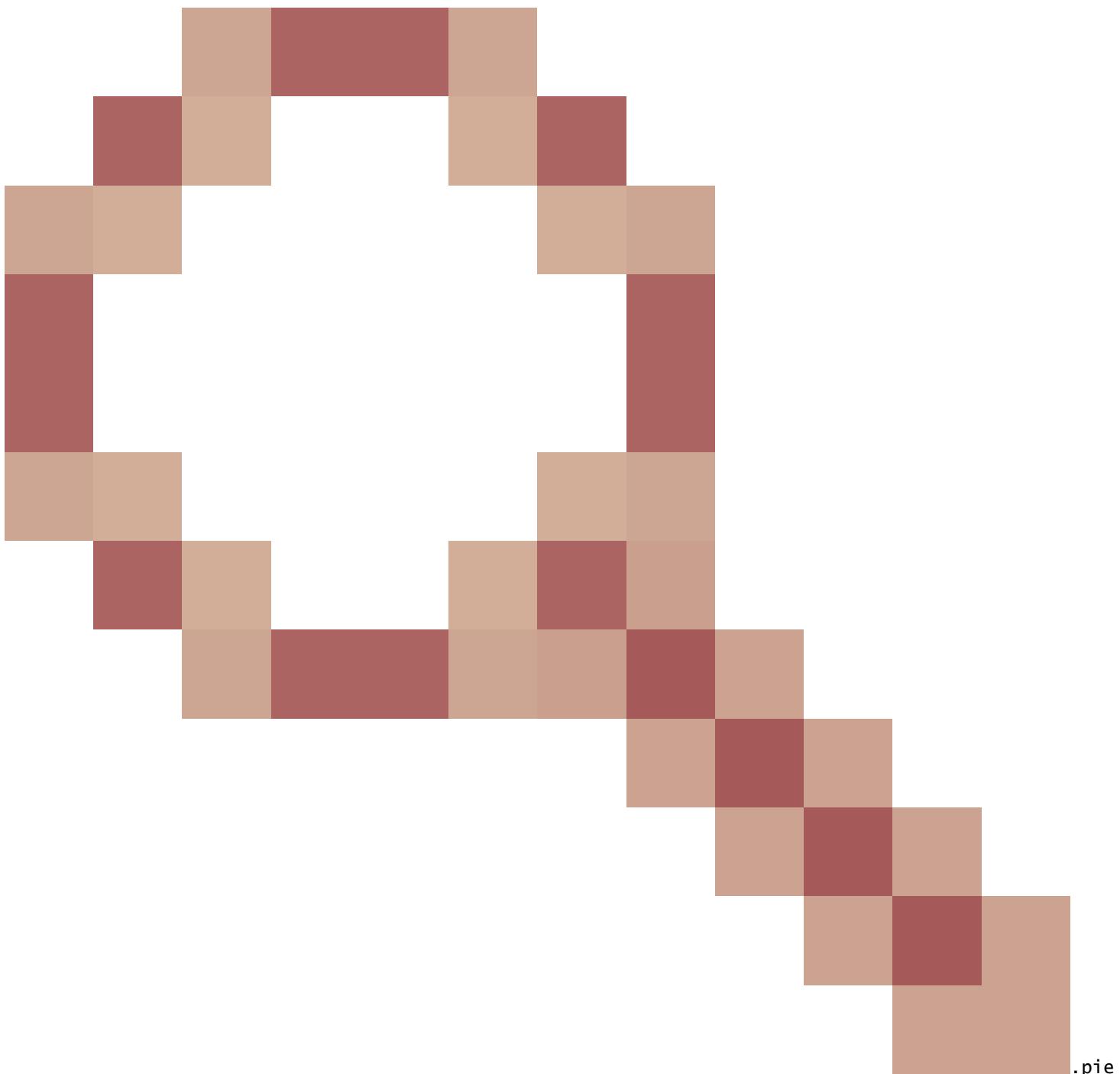
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Info: asr9k-p-4.2.1.CSCub09558

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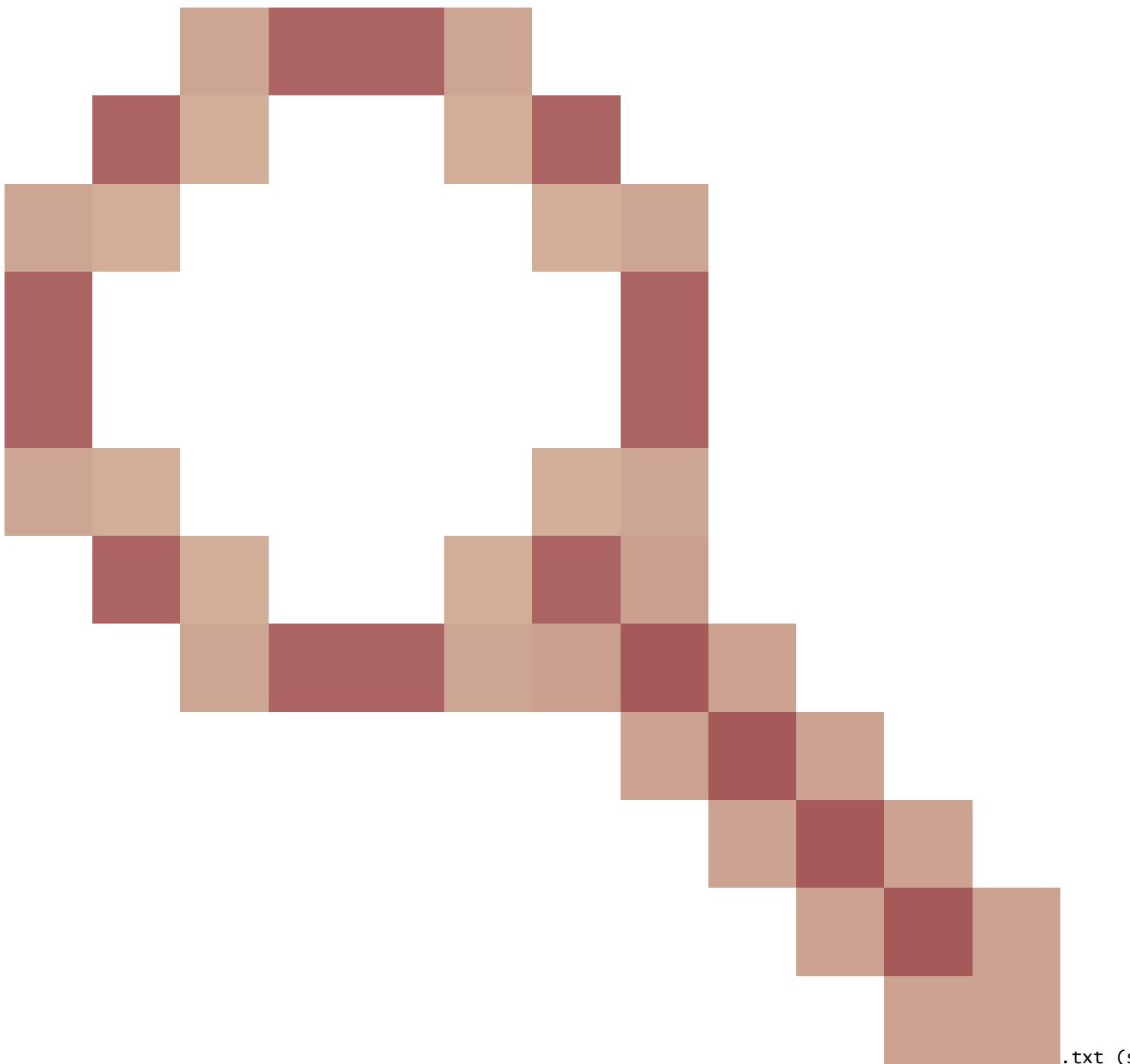
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Info: asr9k-p-4.2.1.CSCub11591
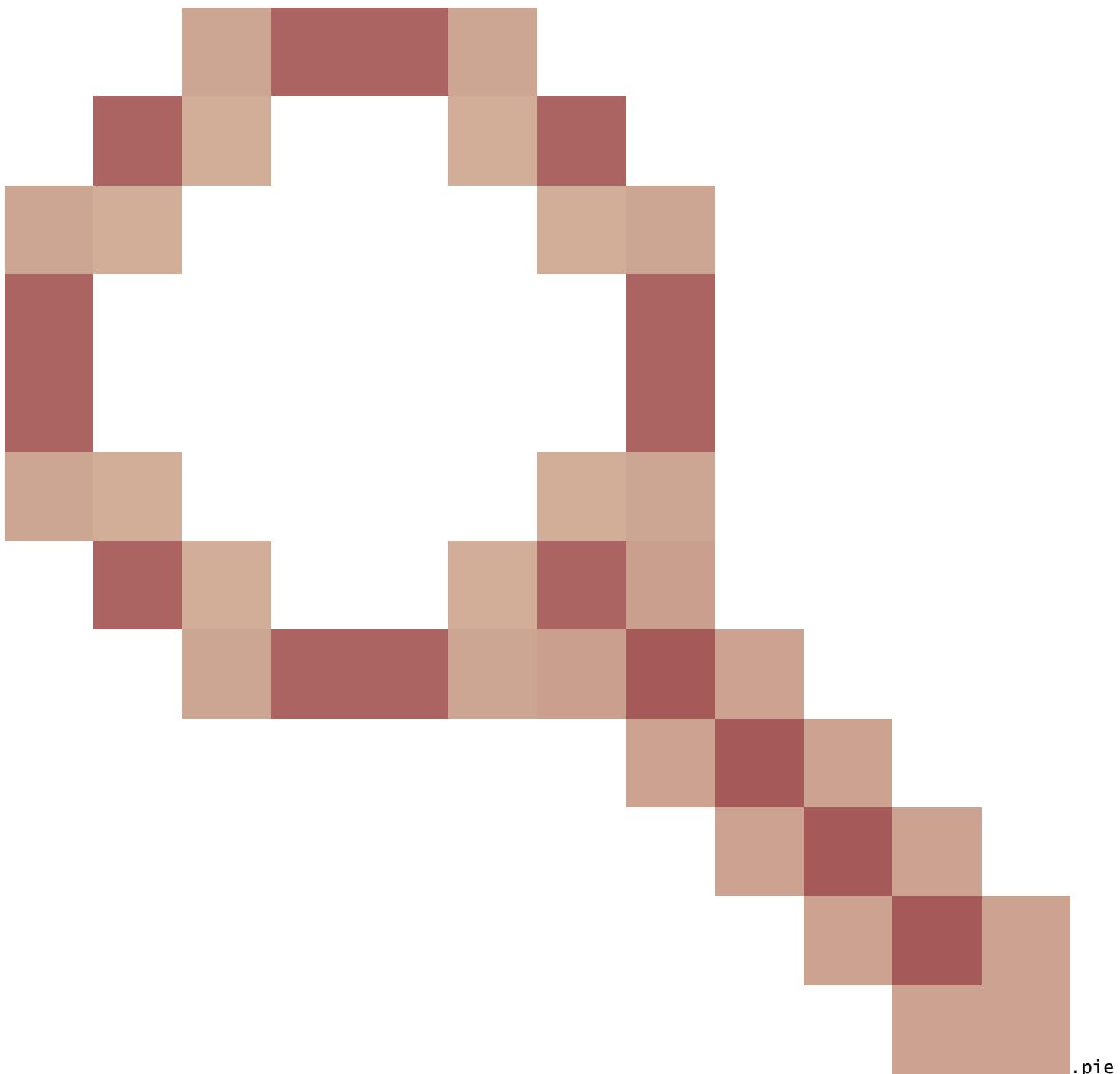
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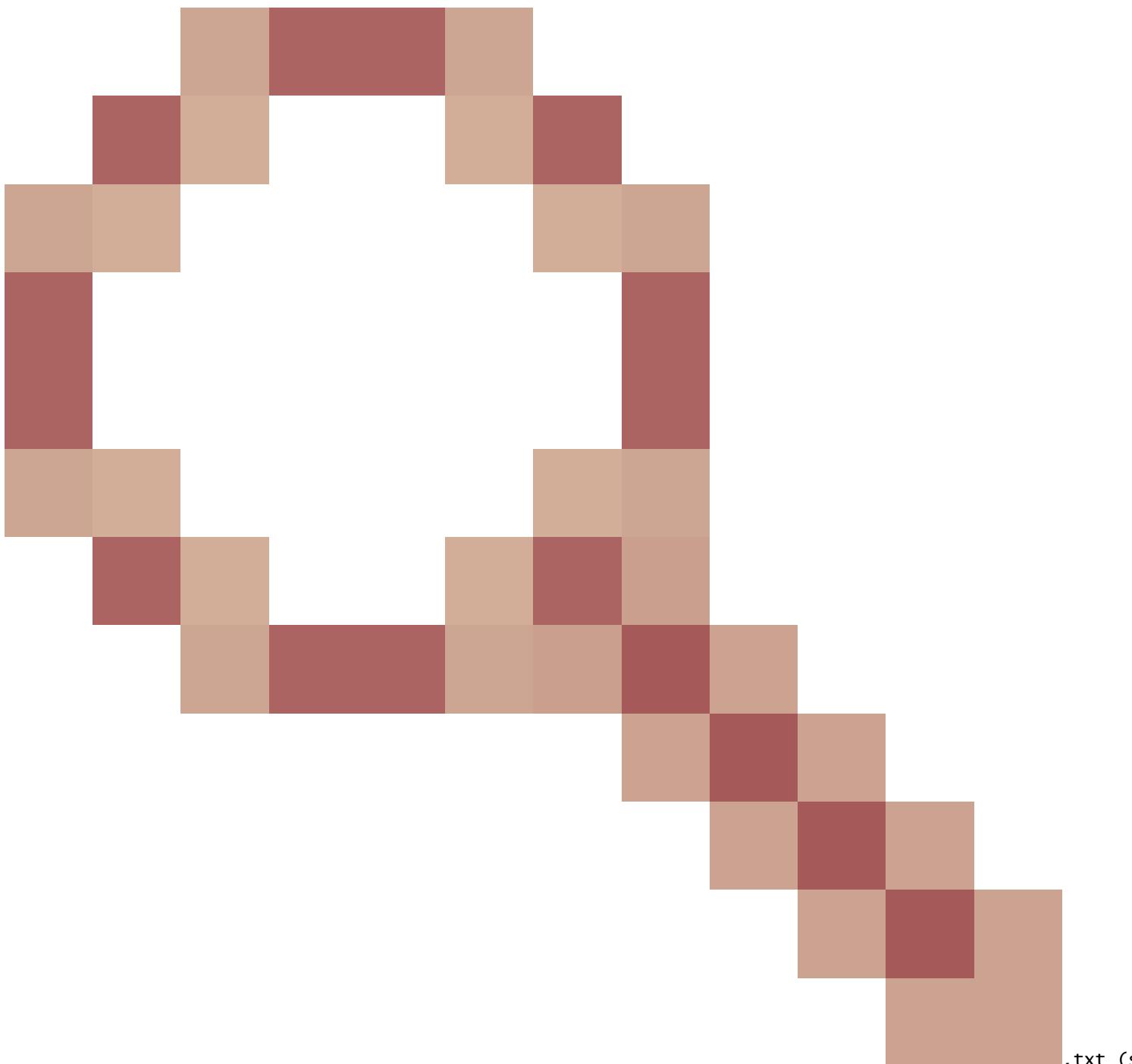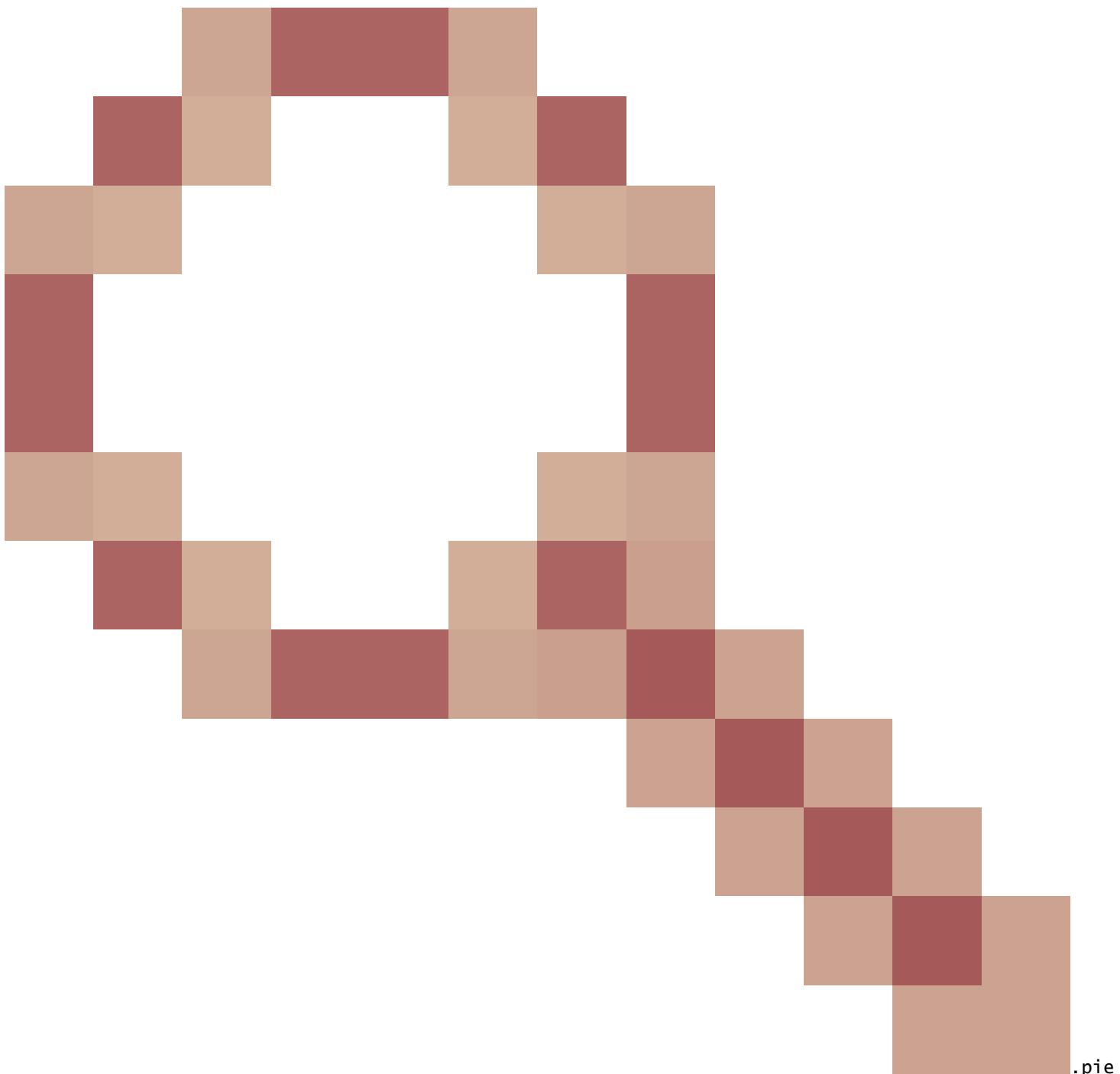
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Info: asr9k-p-4.2.1.CSCub16014

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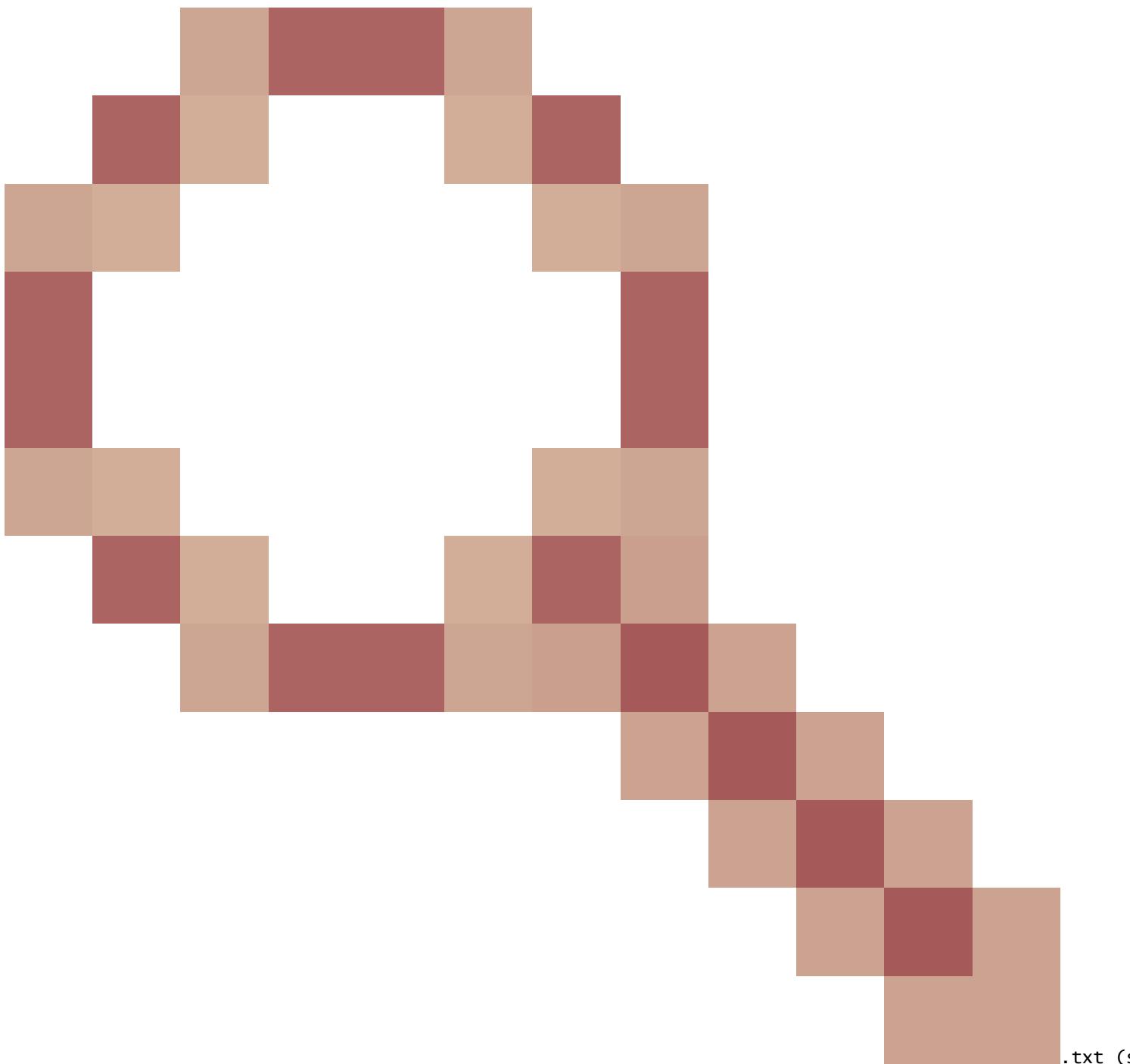
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Info: asr9k-p-4.2.1.CSCub22596
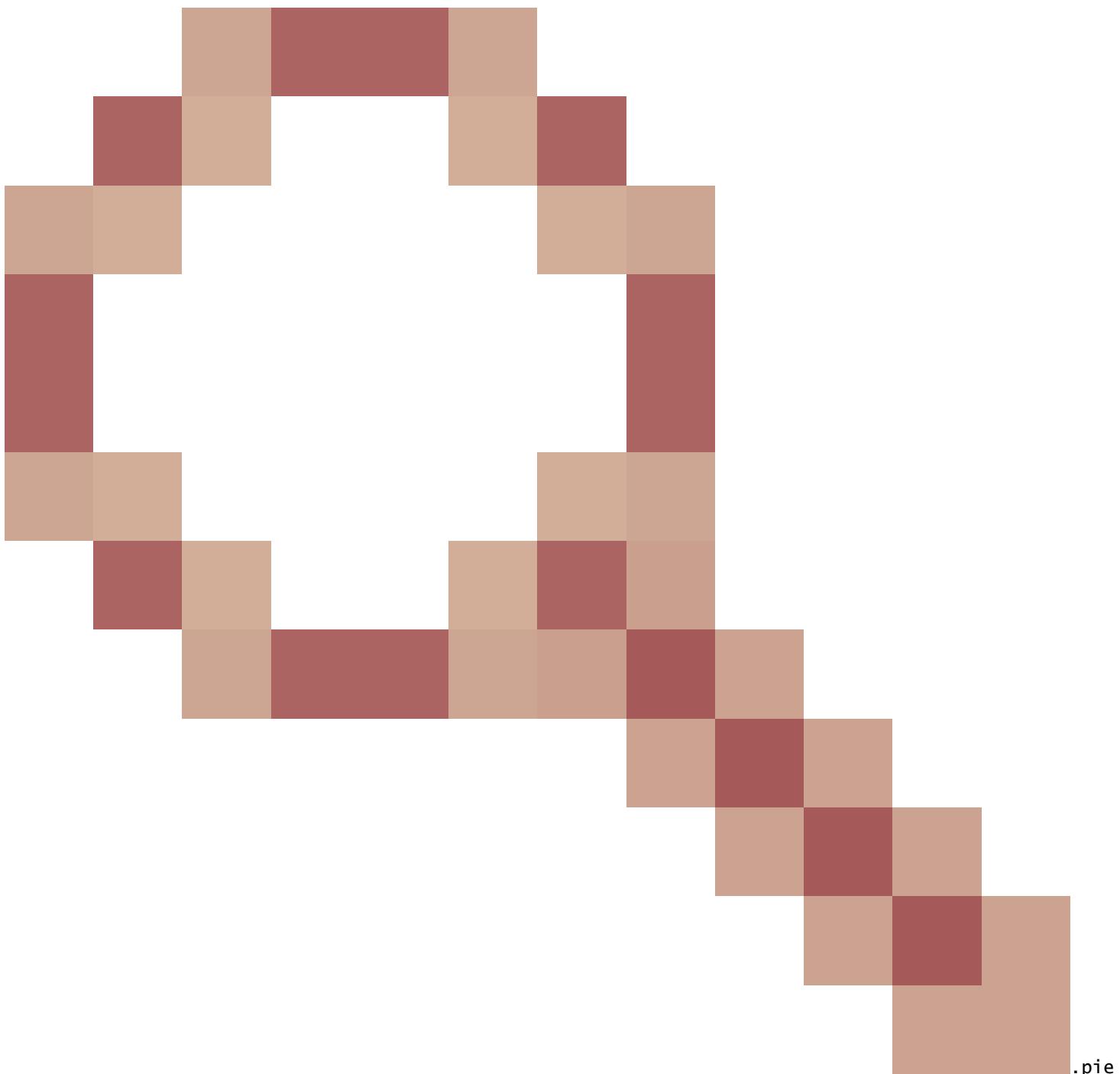
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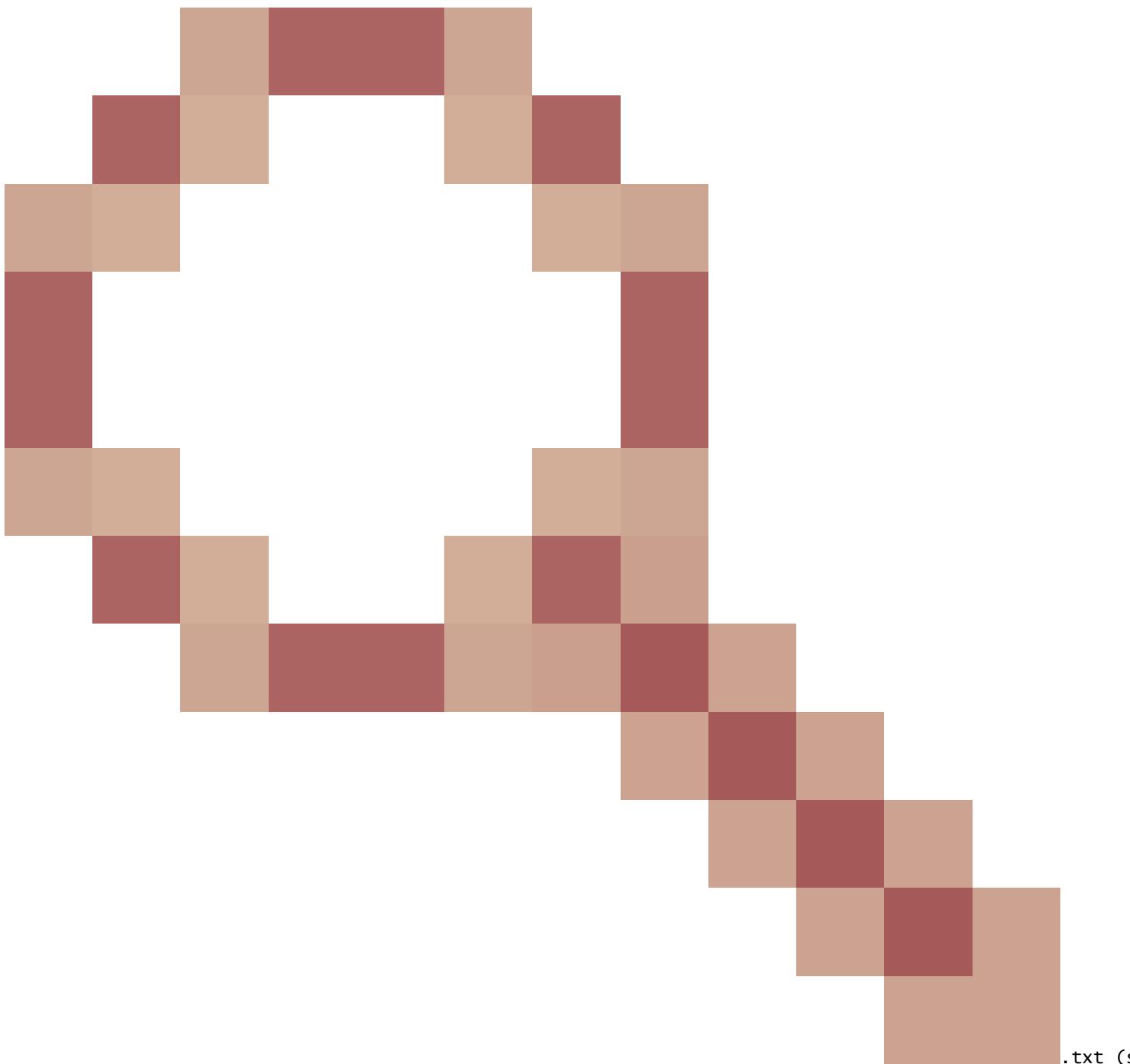
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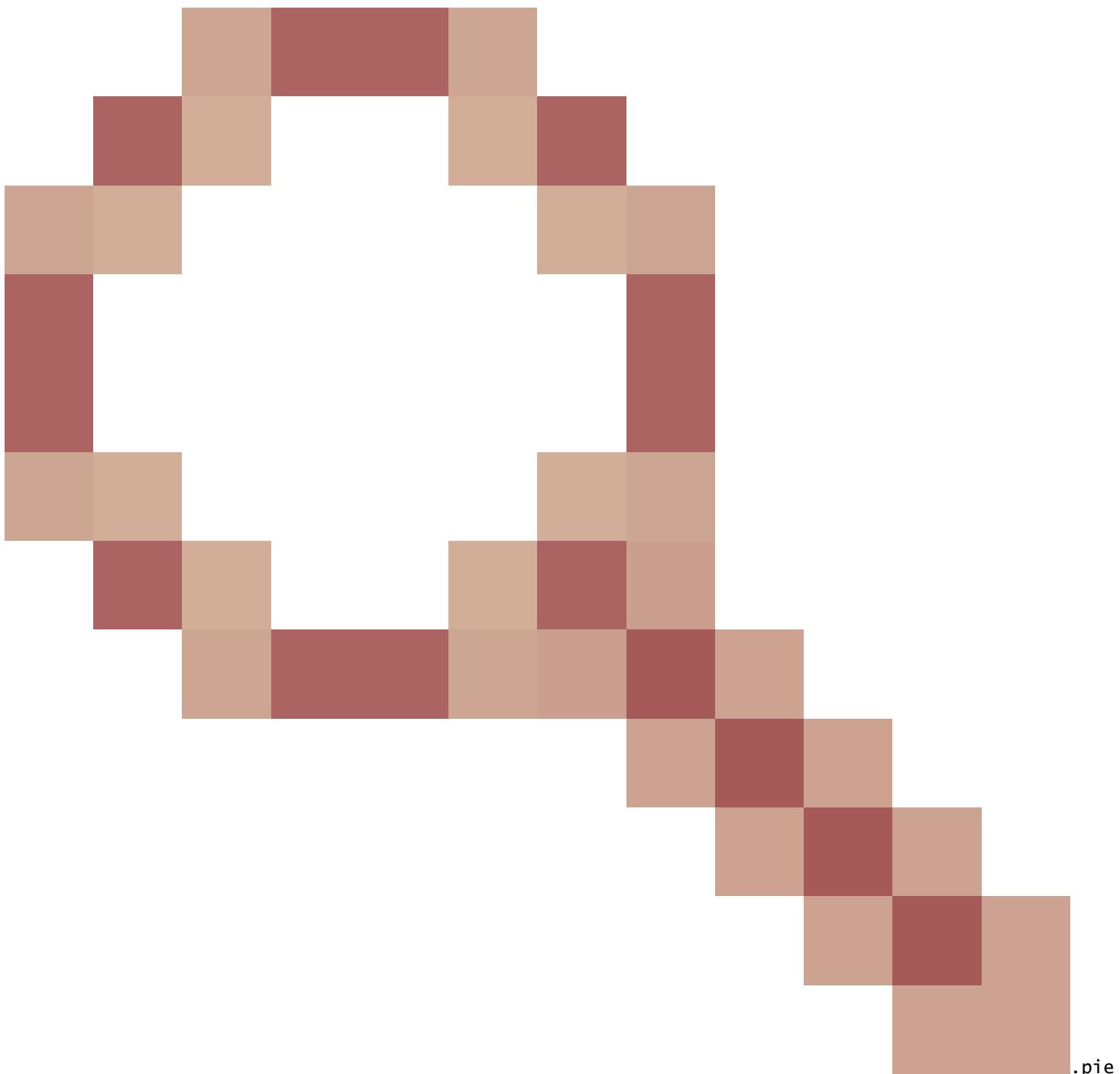
Info: asr9k-p-4.2.1.CSCub27892.pie

Info: asr9k-p-4.2.1.CSCub29765
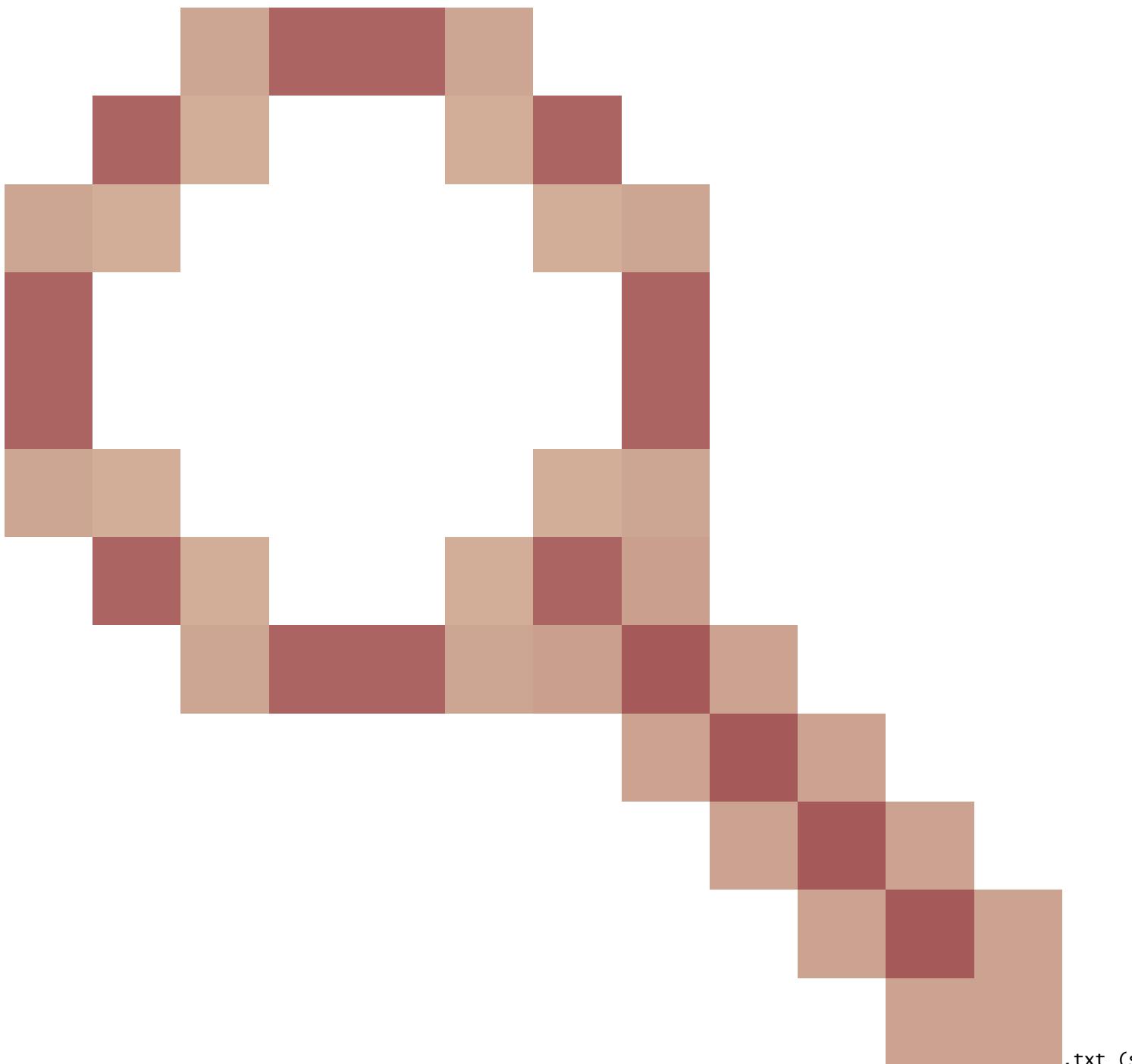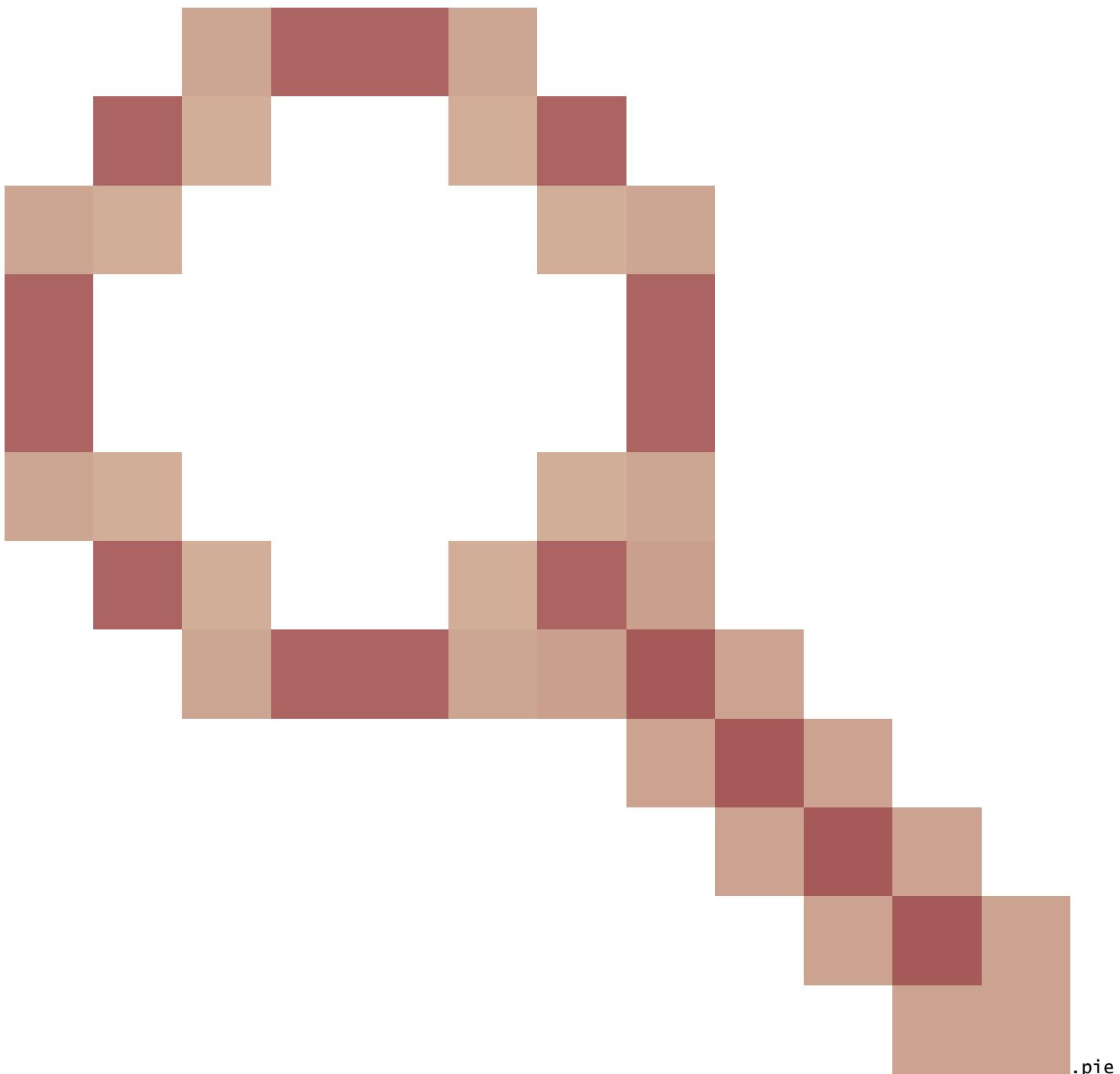
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.txt (s

Info: asr9k-p-4.2.1.CSCub41271
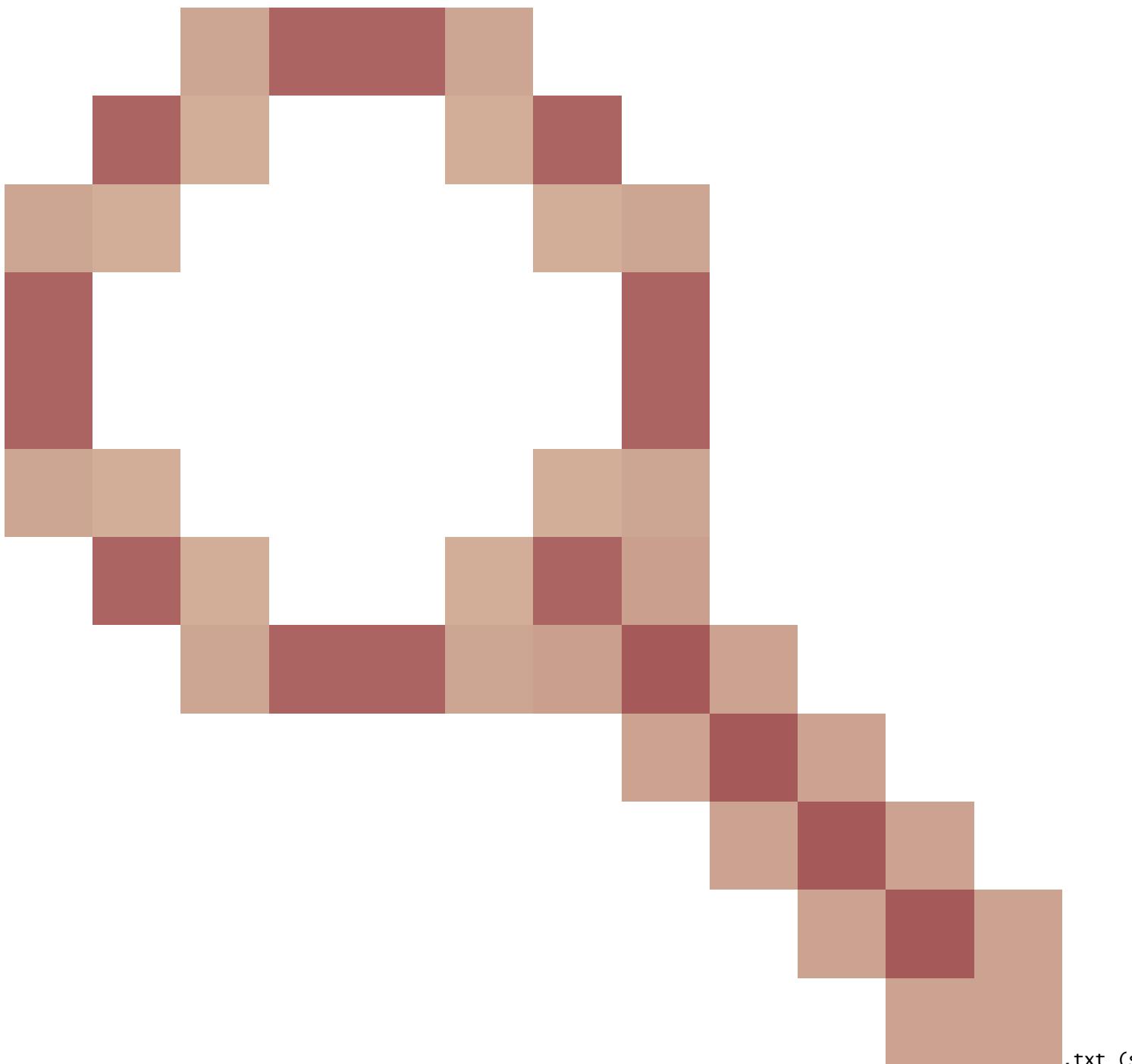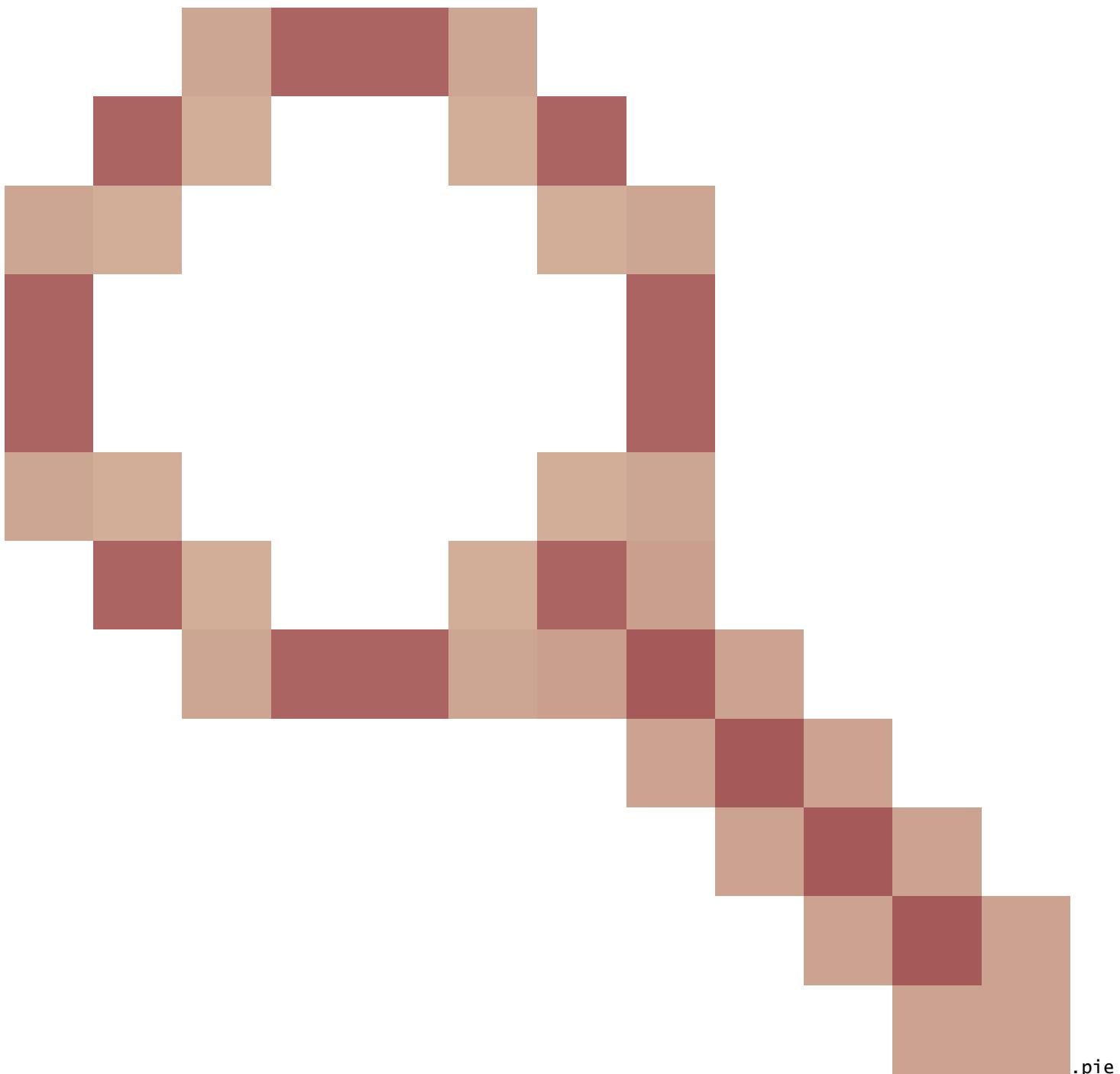
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.txt (s

Info: asr9k-p-4.2.1.[CSCub42561](https://...)
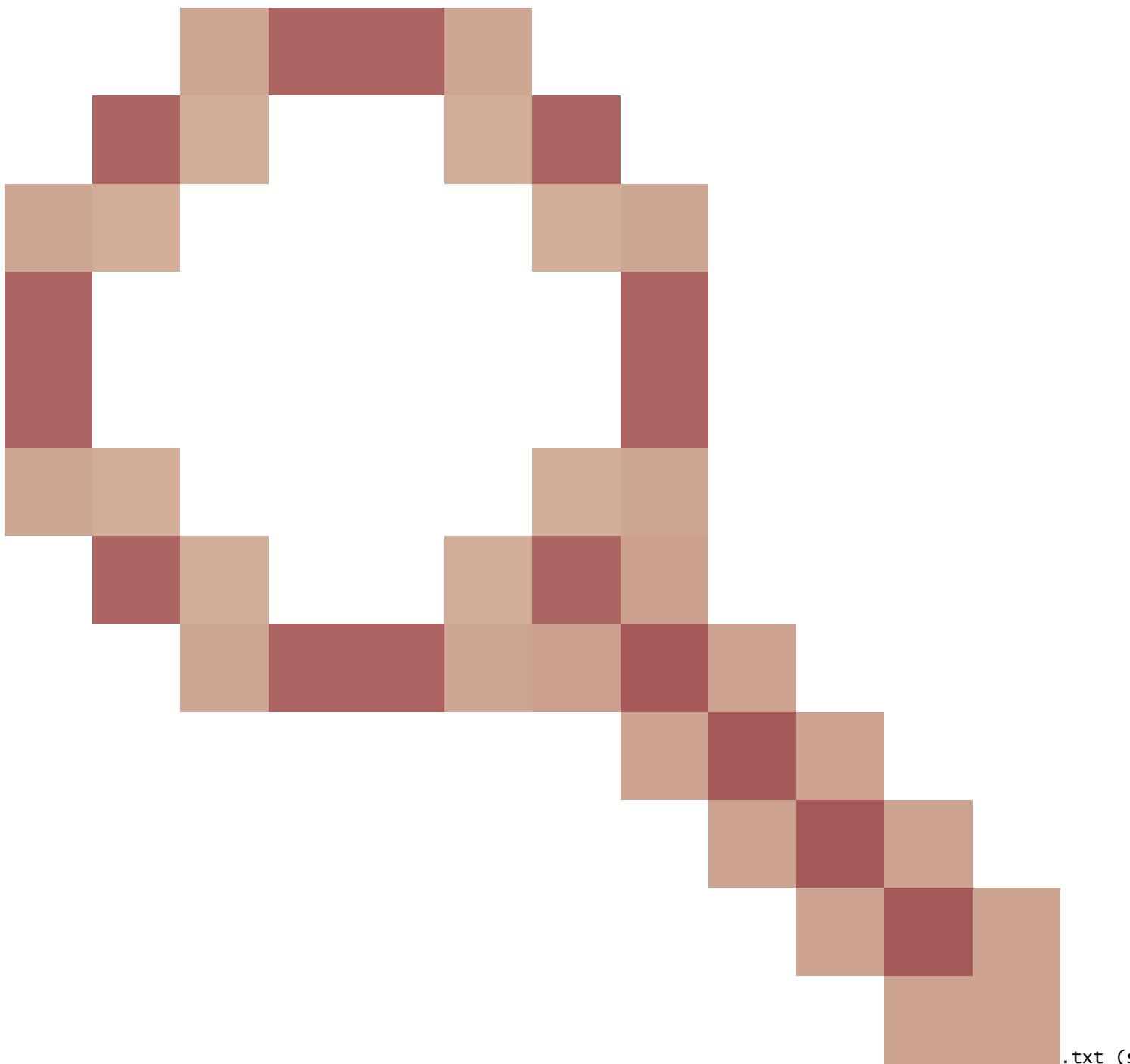
Info: asr9k-p-4.2.1.[CSCub42561](#)

.txt (s

Info: asr9k-p-4.2.1.CSCub48041
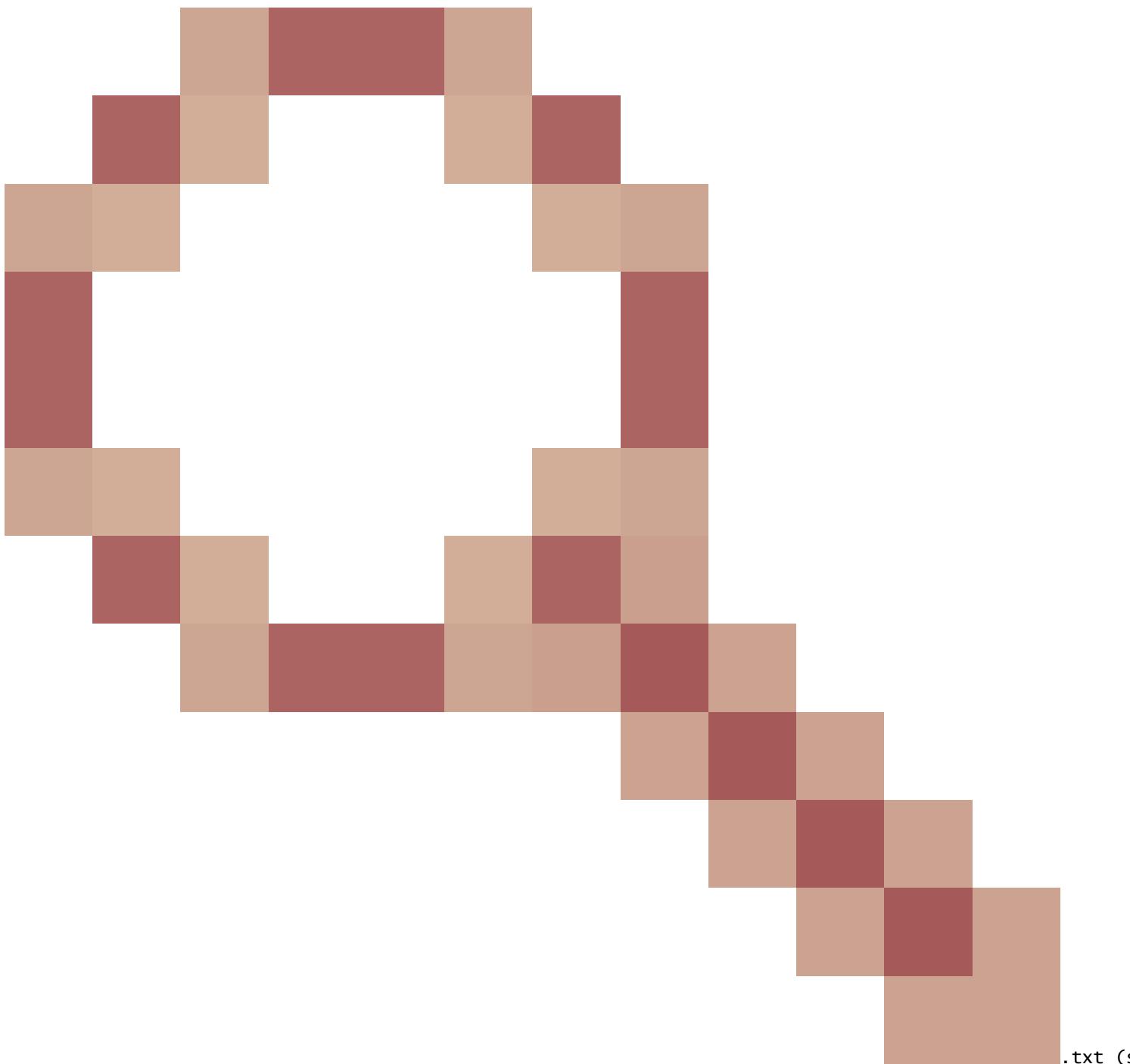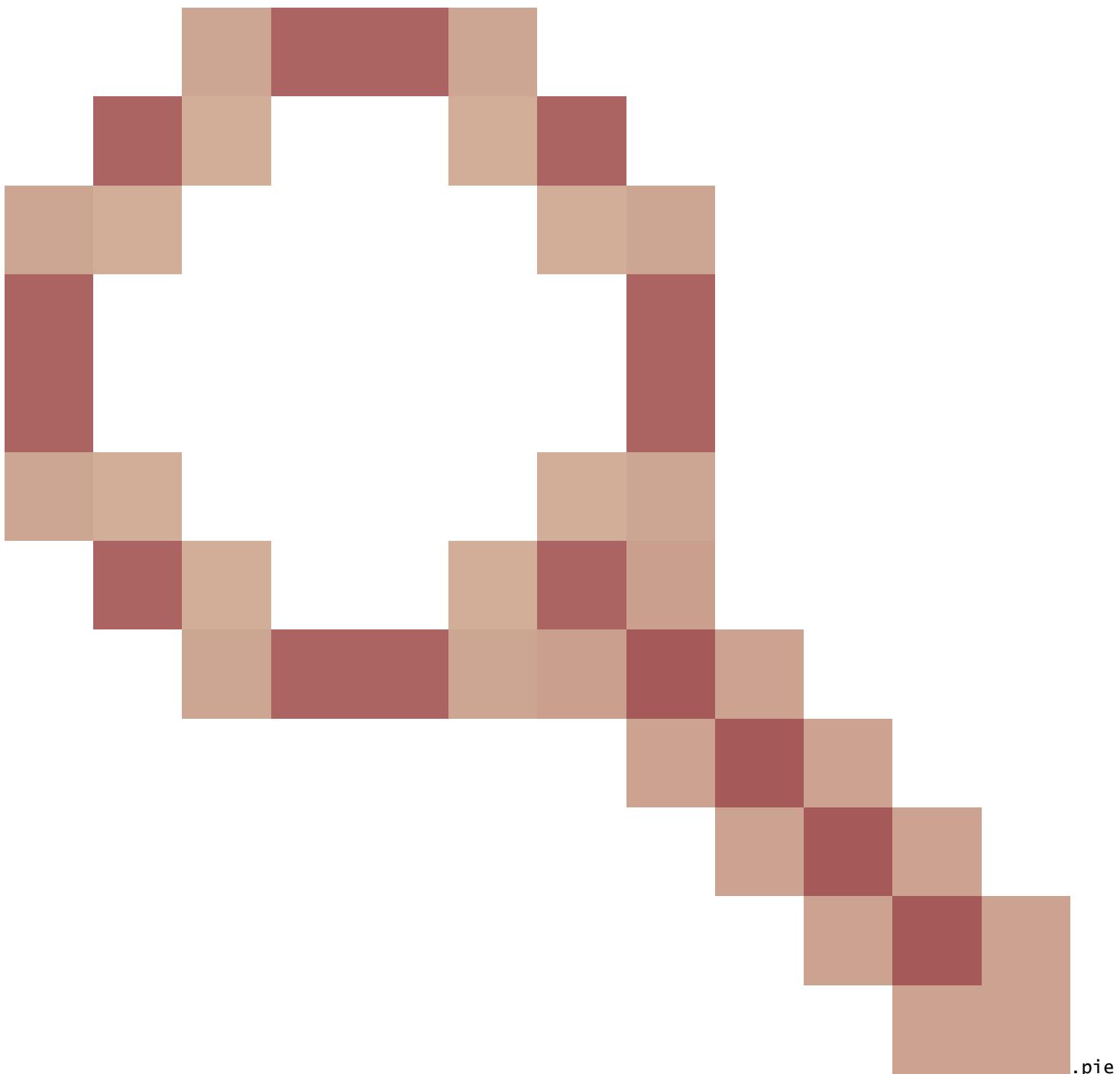
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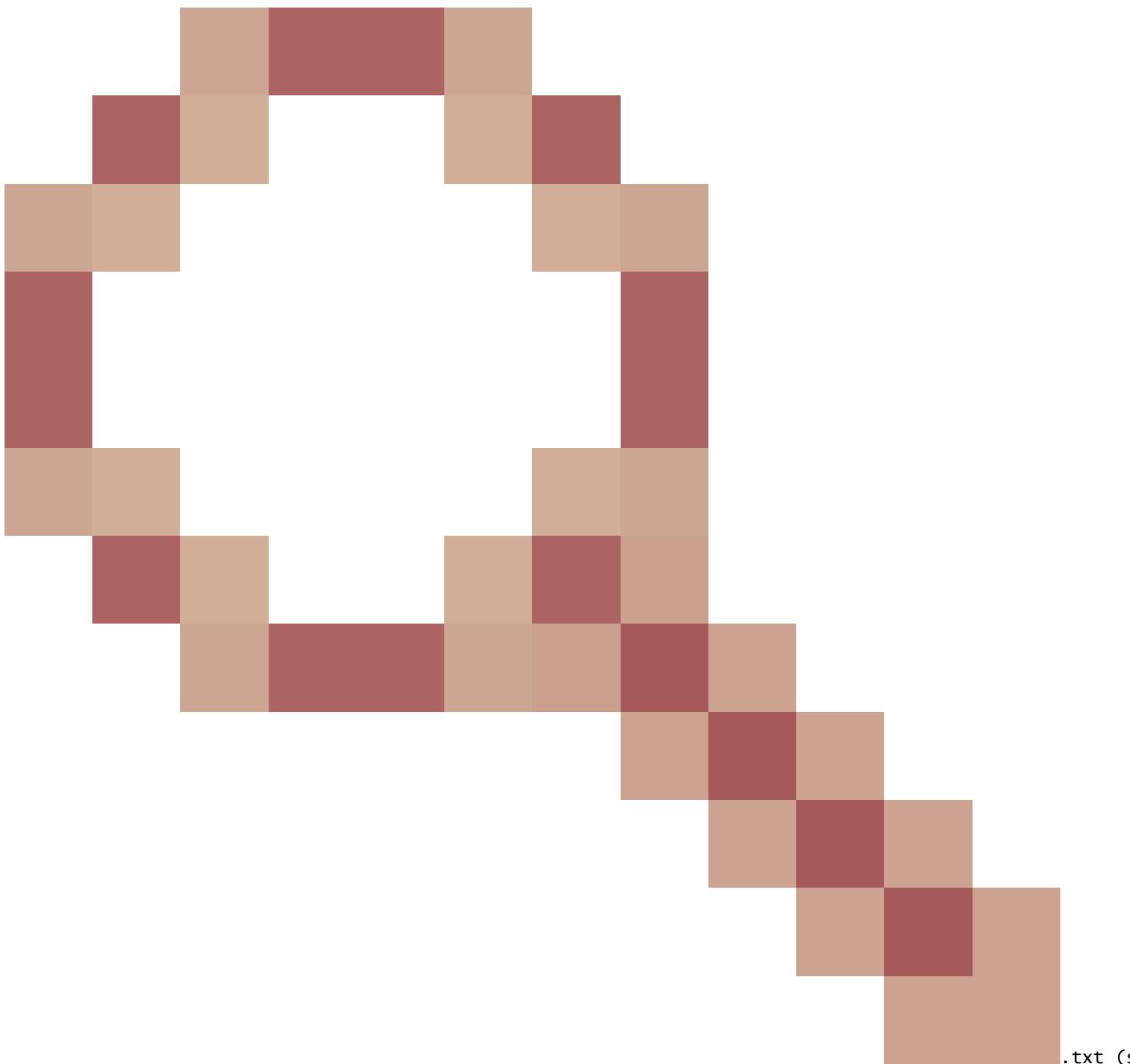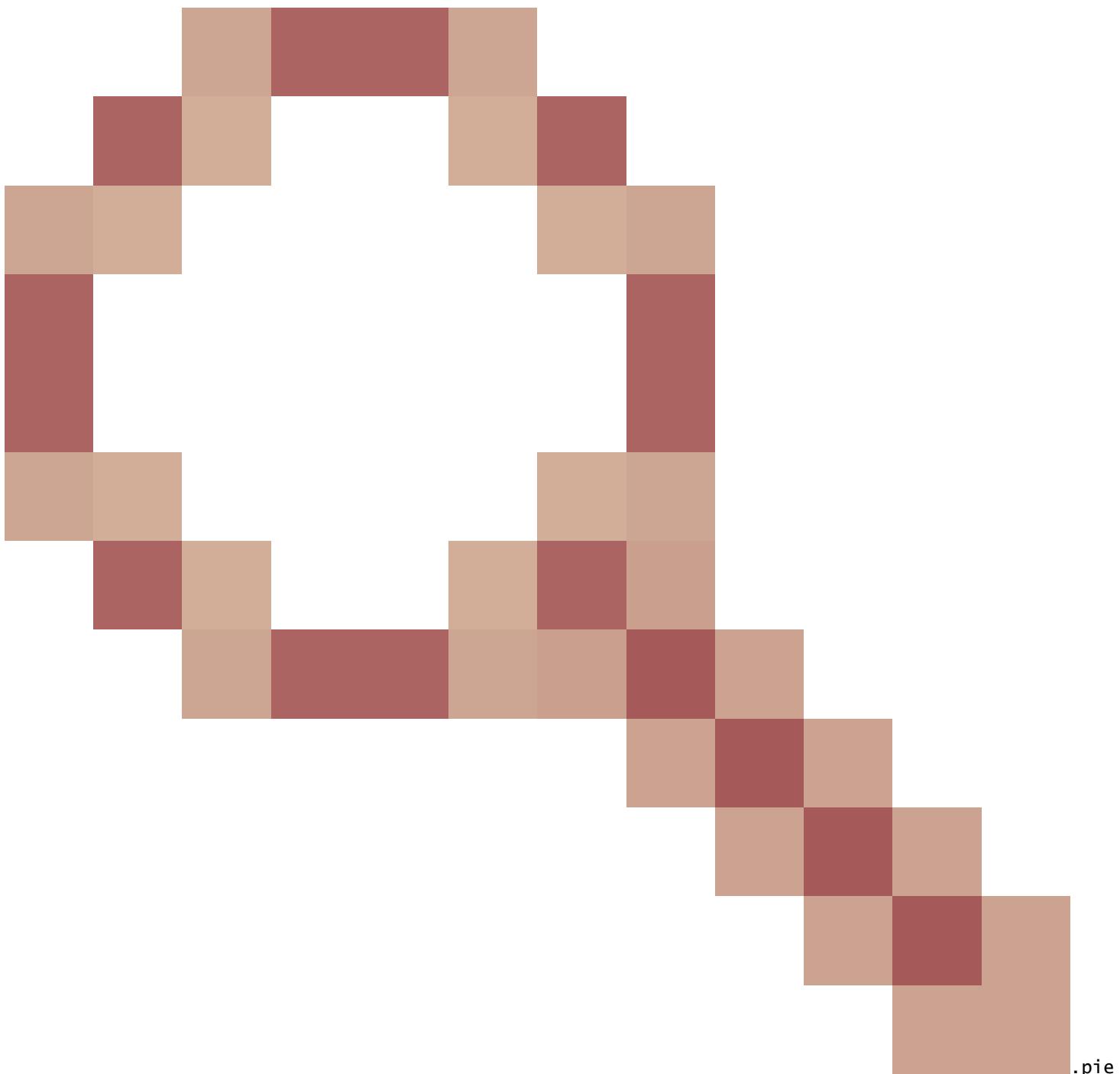
.txt (s

Info: asr9k-p-4.2.1.CSCub63396

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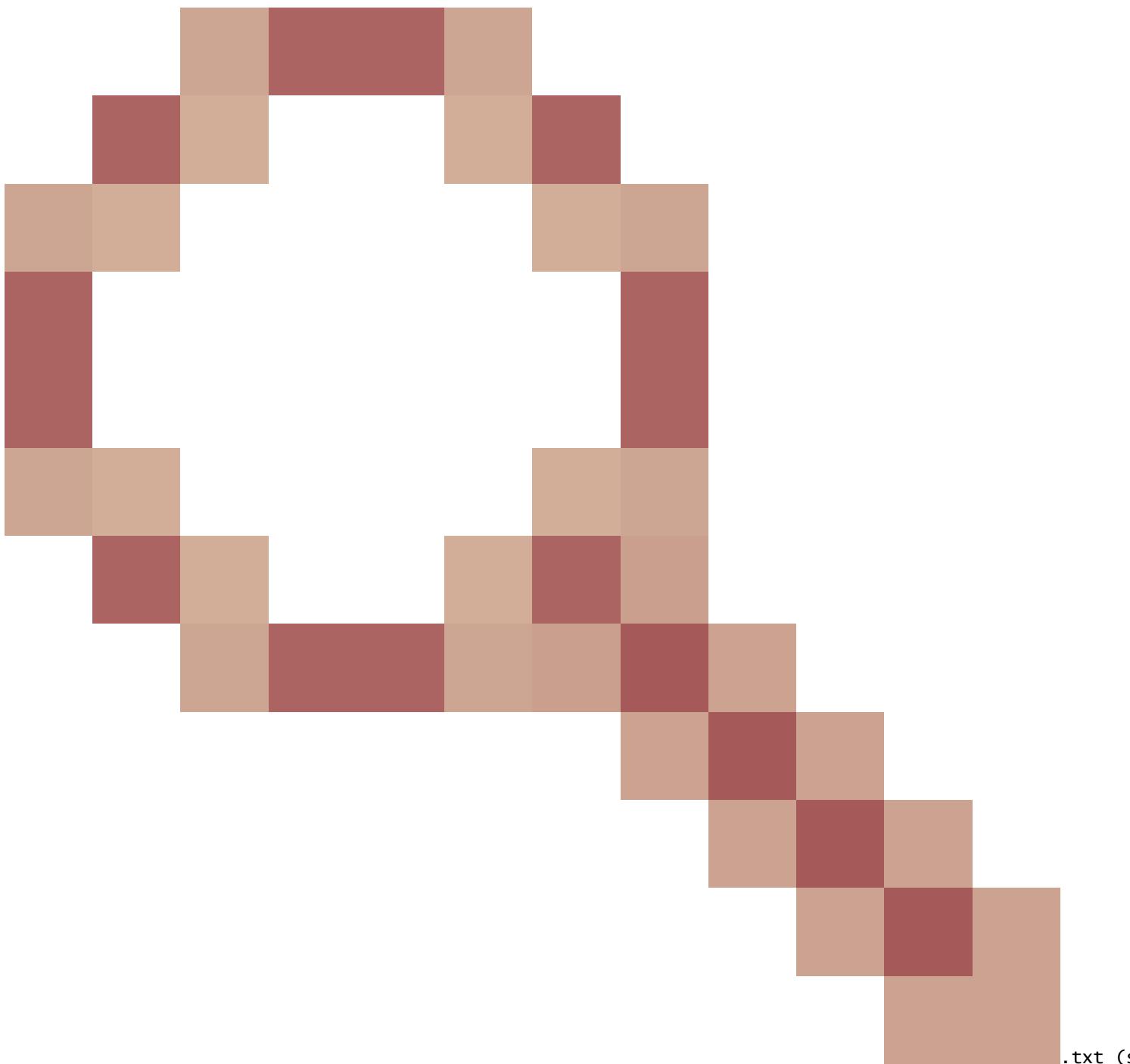
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Info: asr9k-p-4.2.1.CSCub68512
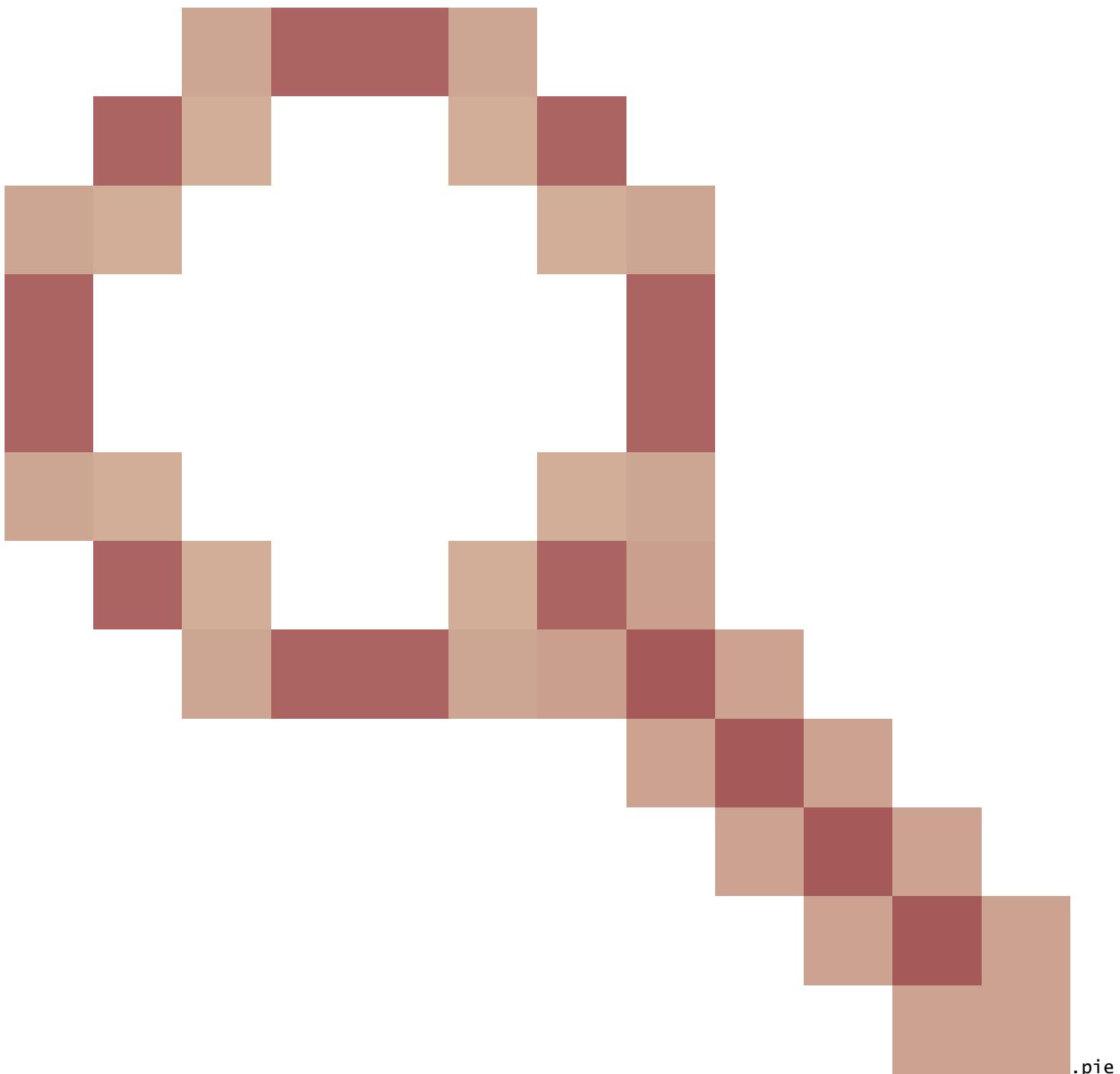
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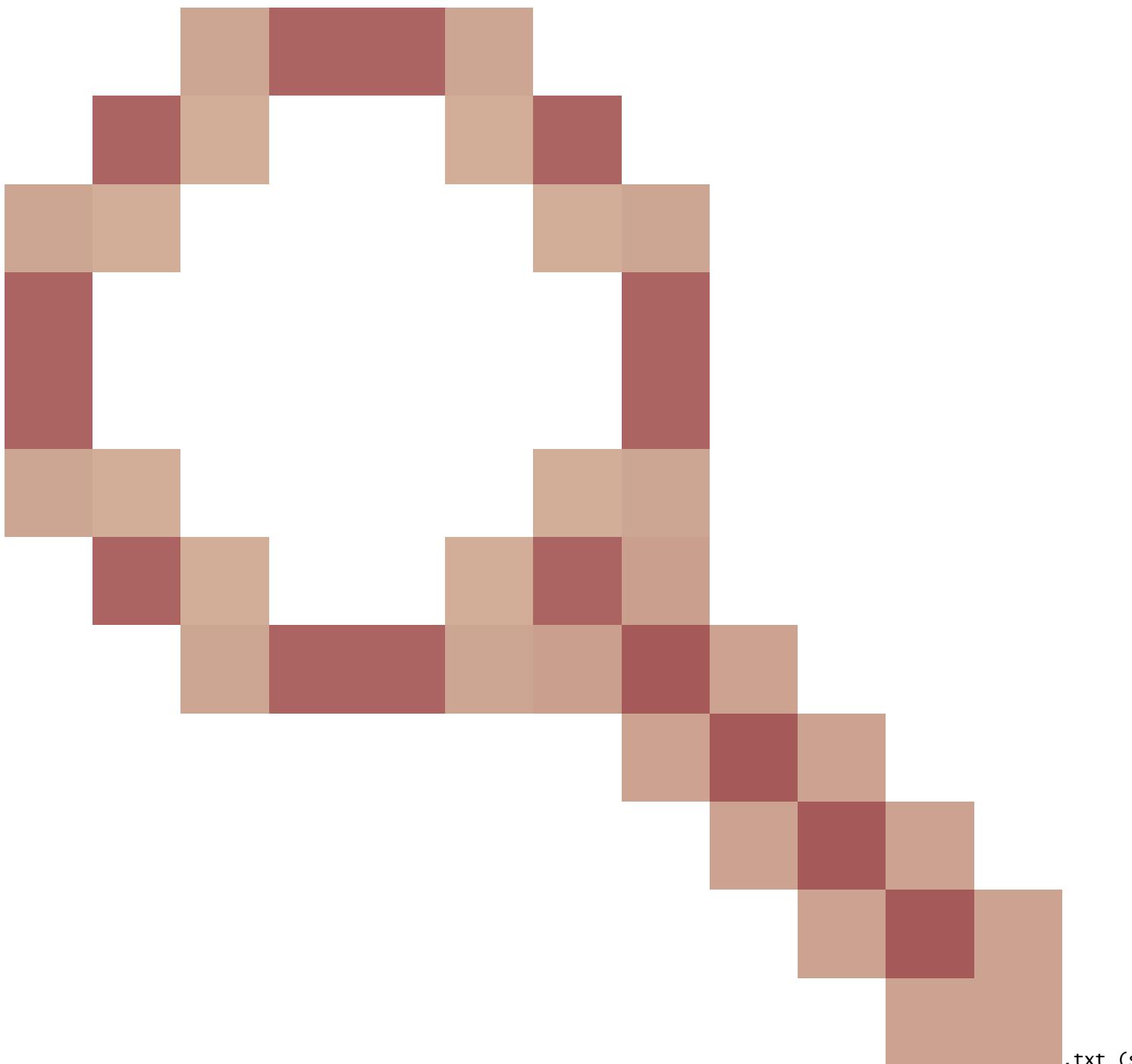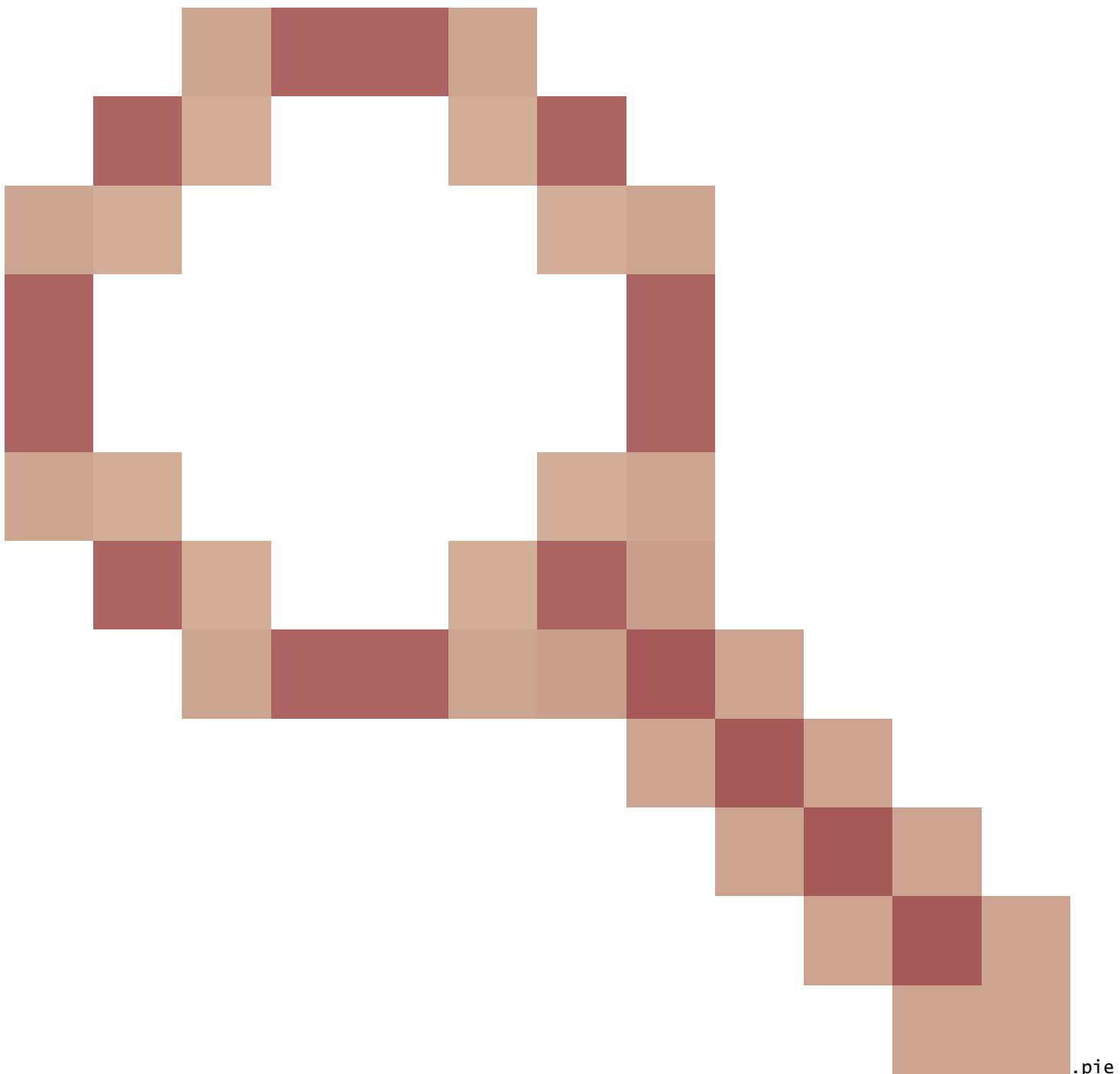
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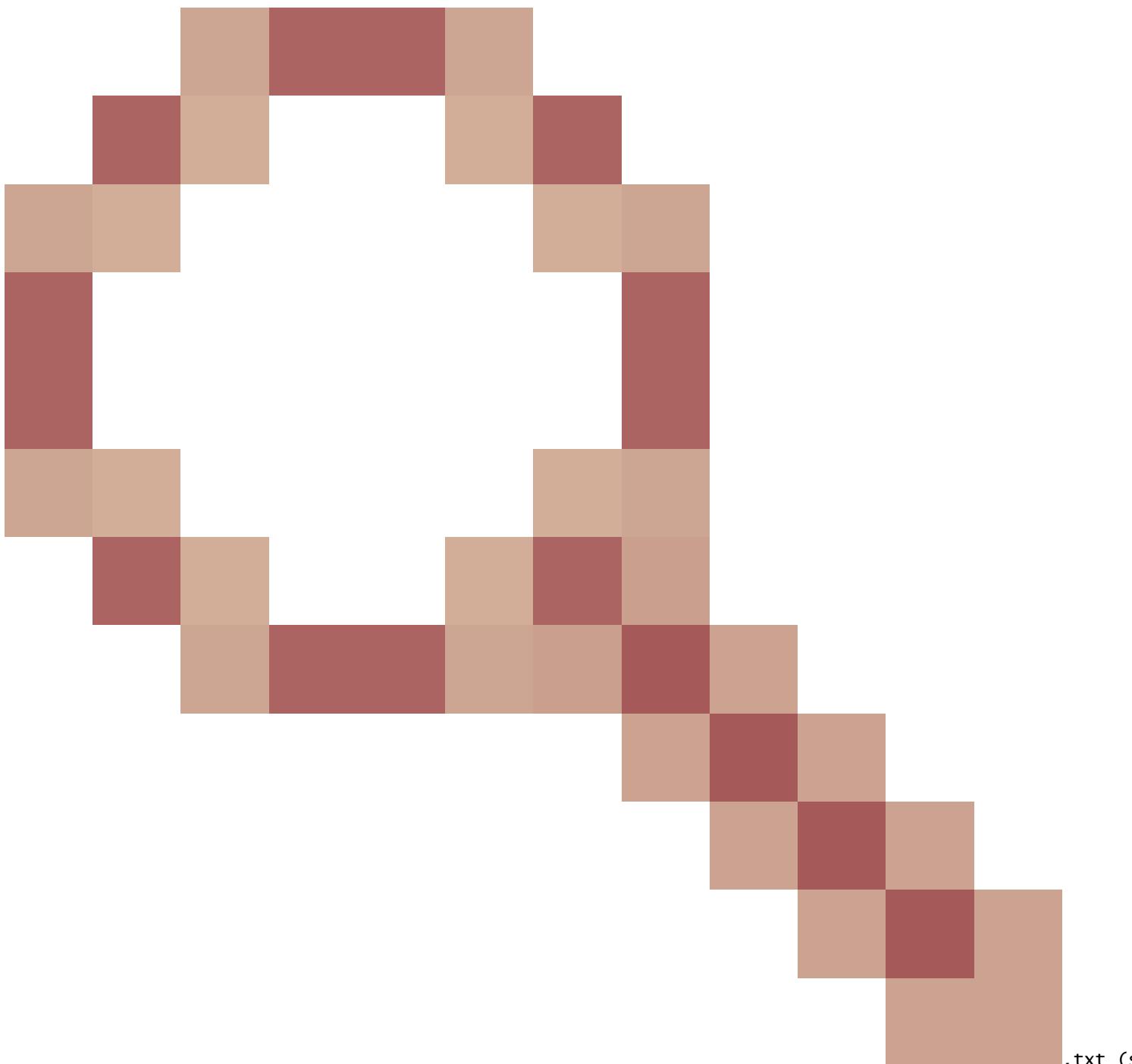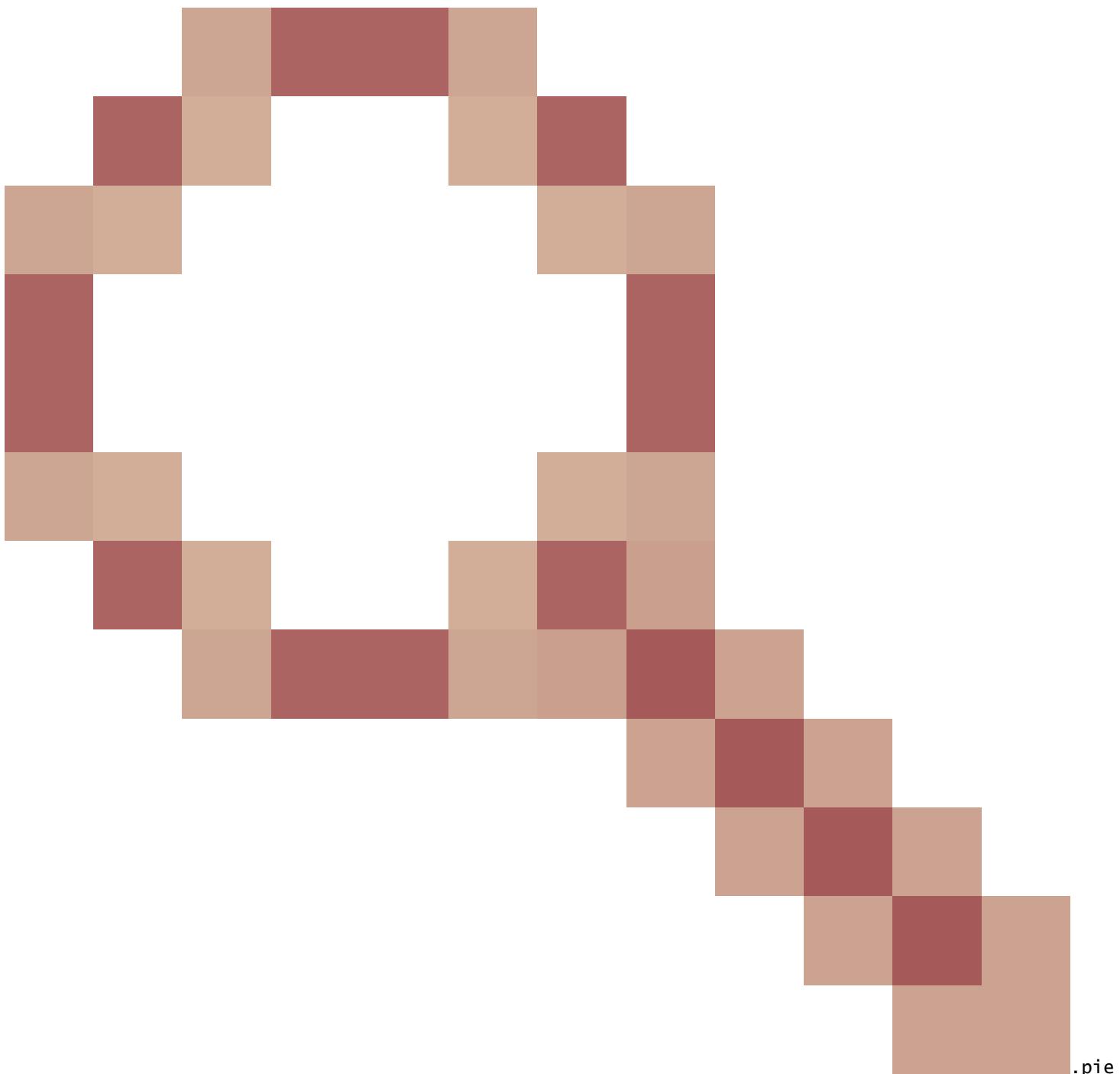
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Info: asr9k-p-4.2.1.CSCub76221
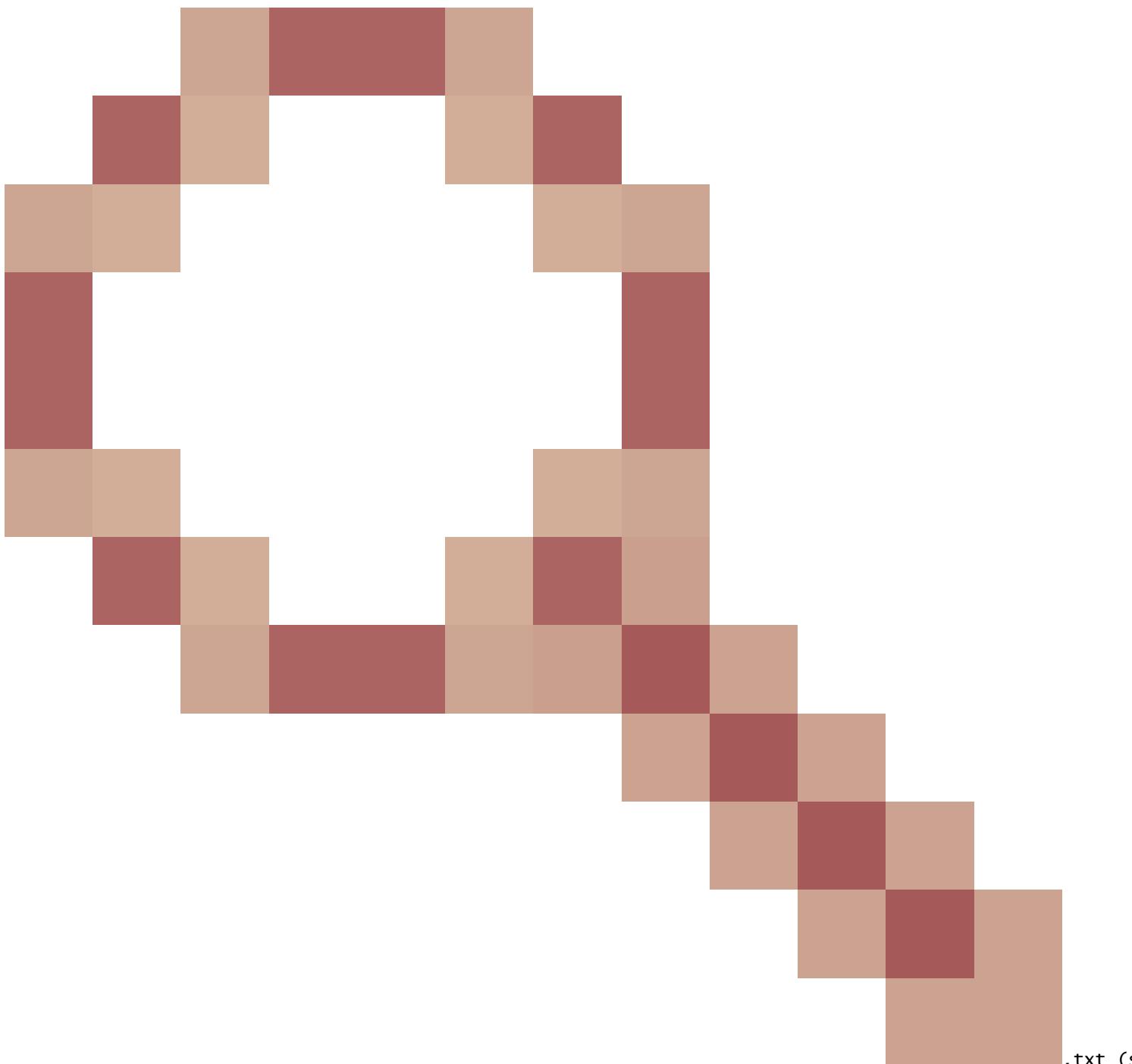
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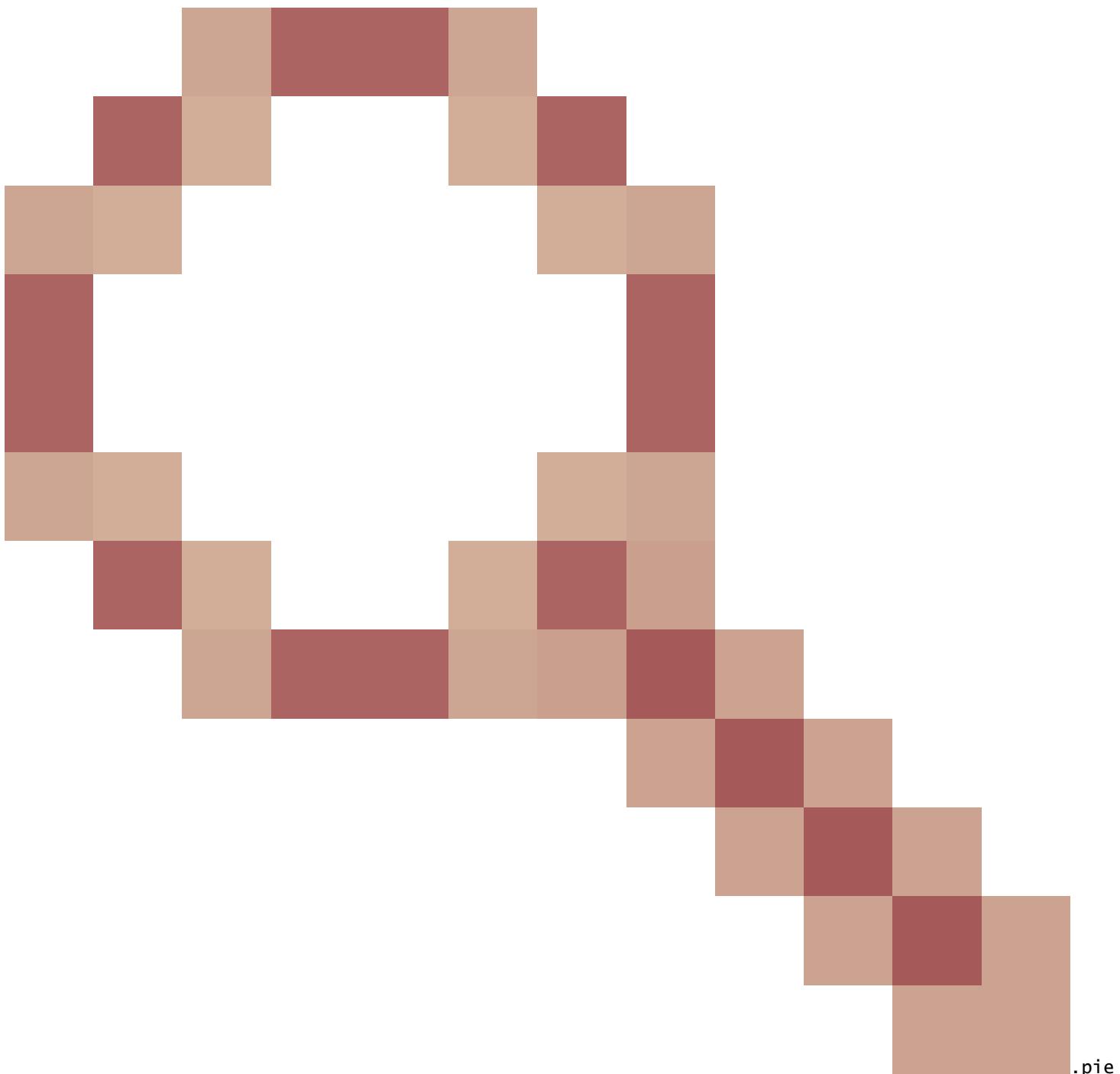
.txt (s

Info: asr9k-p-4.2.1.CSCub93663

Info: asr9k-p-4.2.1.[CSCub93663](#).pie
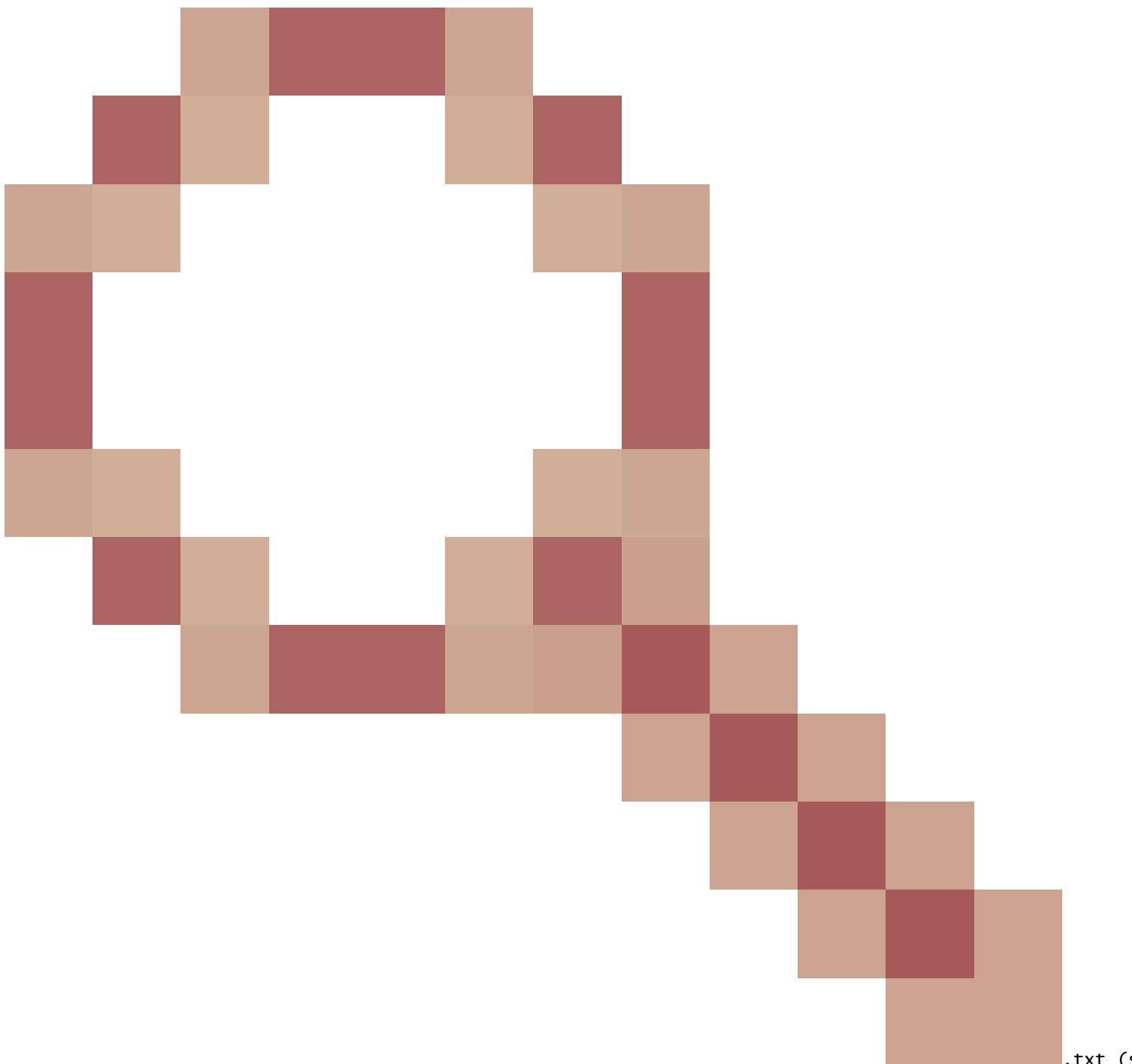
.txt (s

Info: asr9k-p-4.2.1.CSCub96985
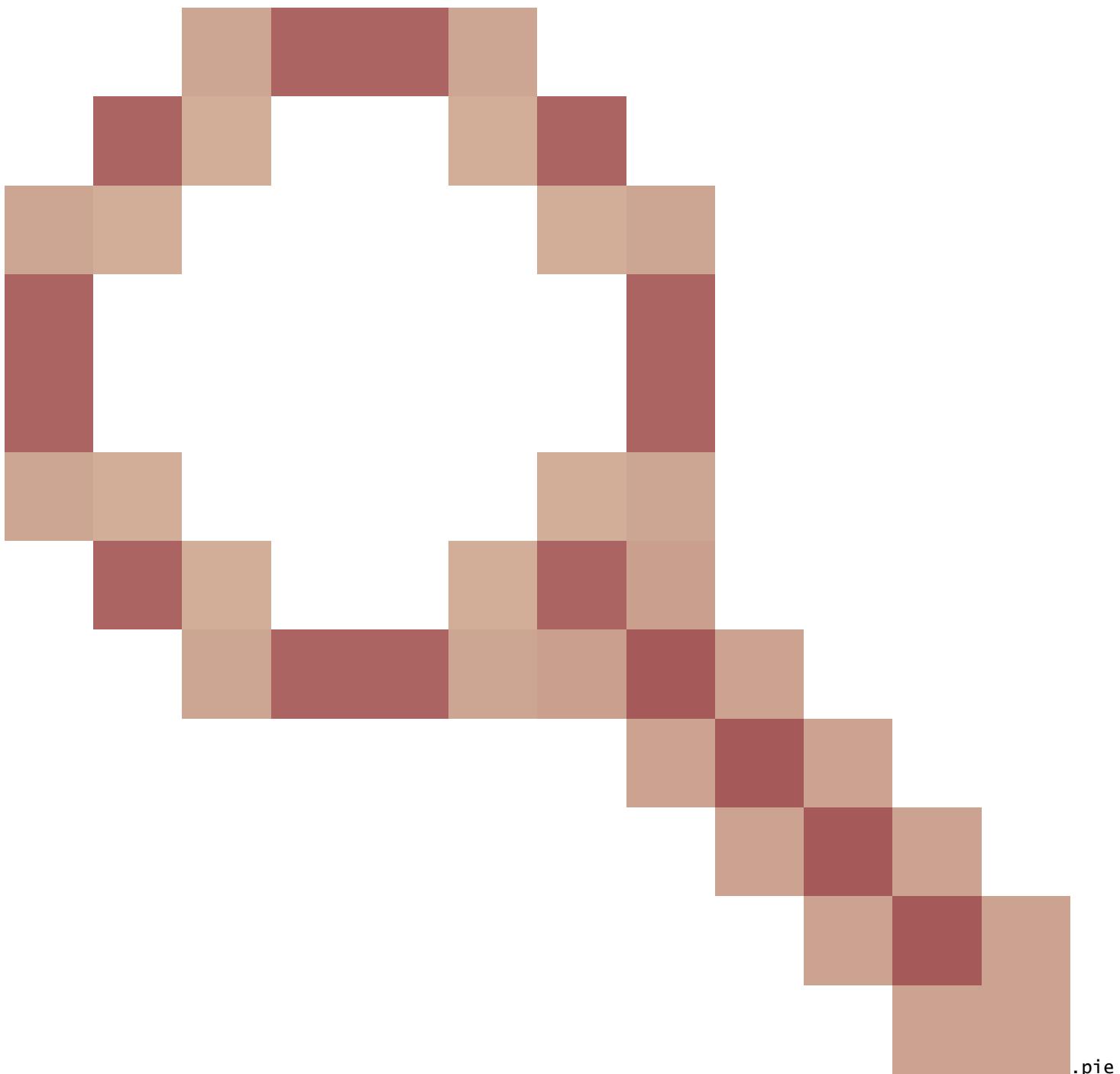
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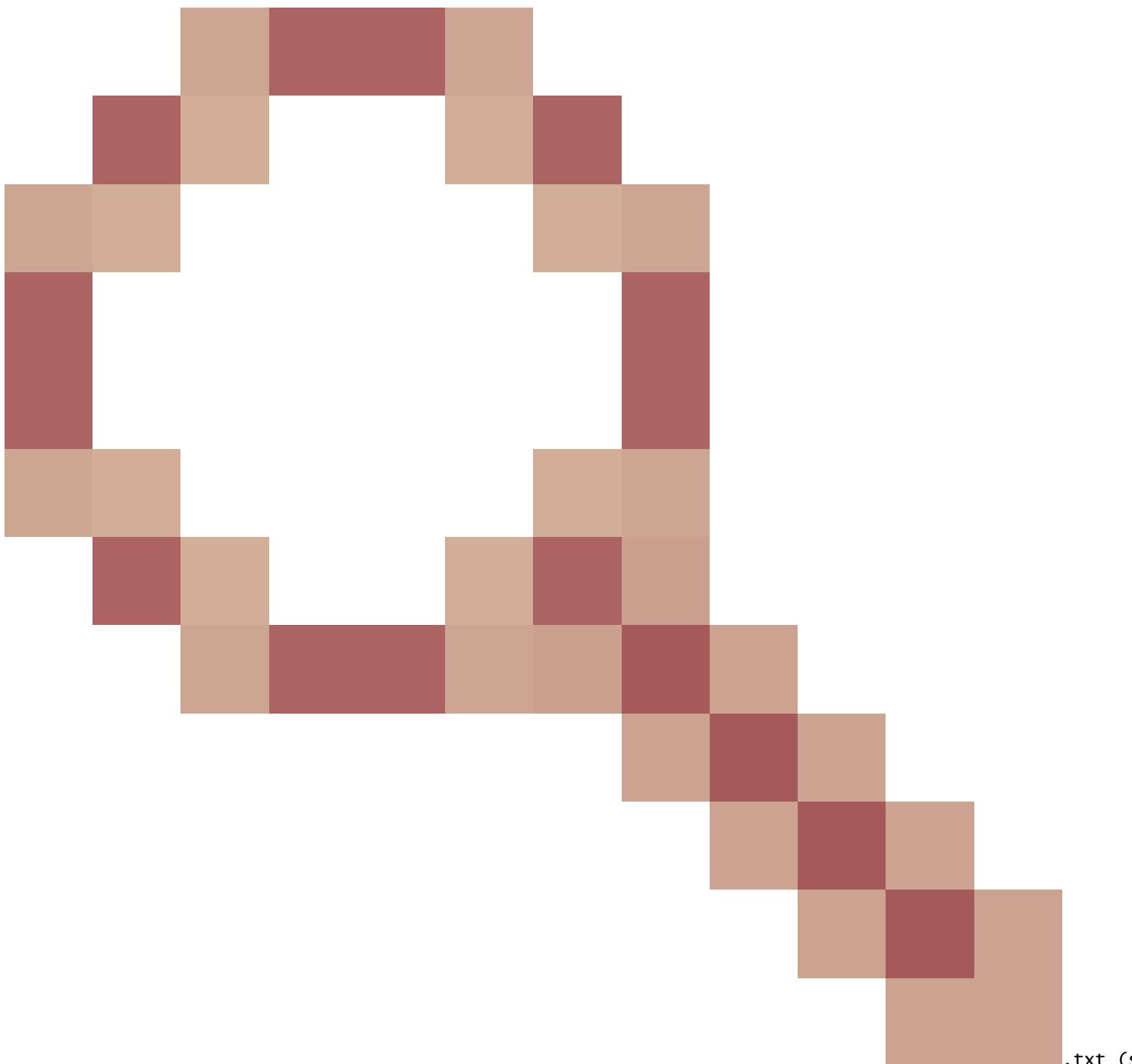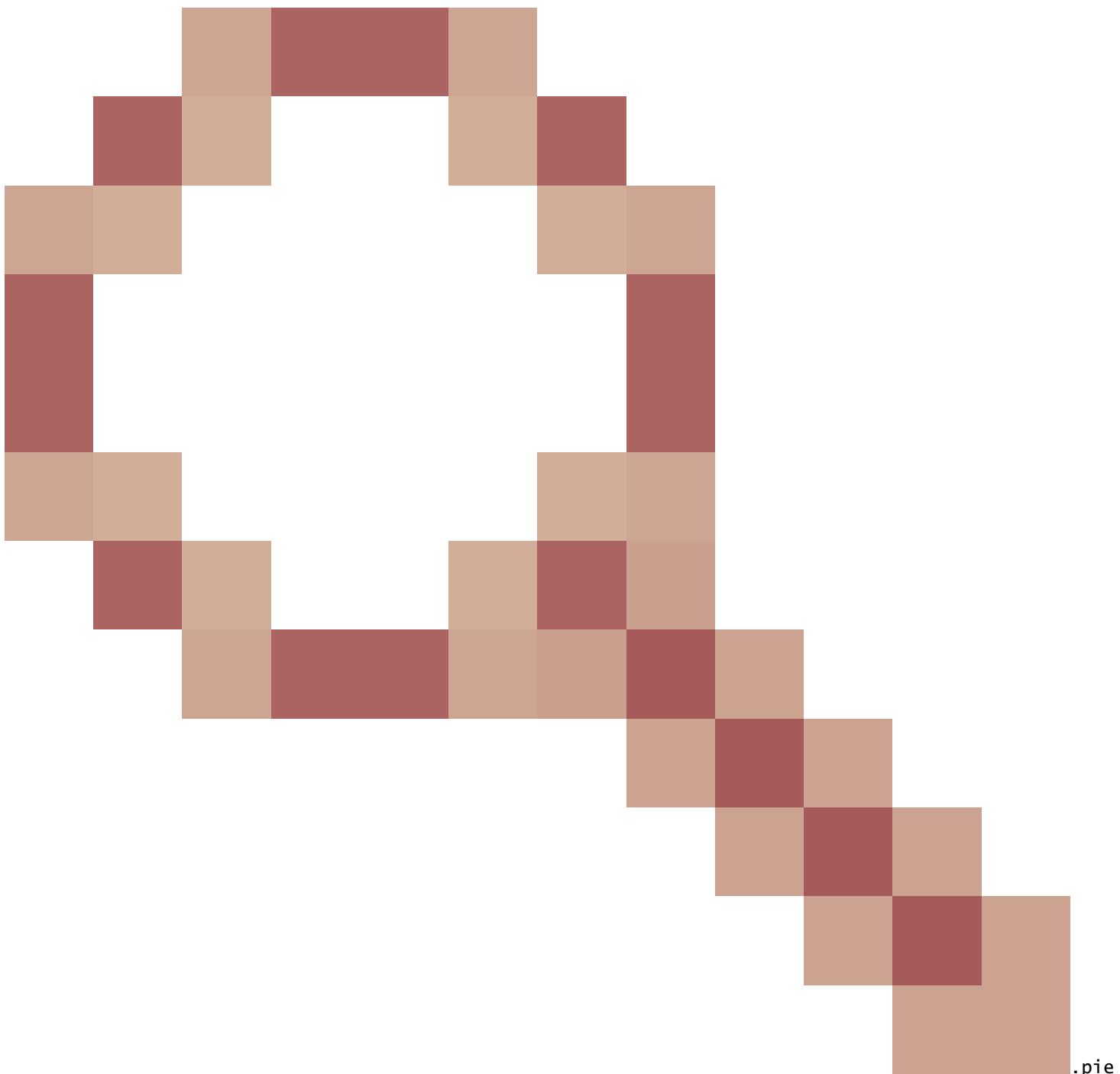
.txt (s

Info: asr9k-p-4.2.1.[CSCub98258](#)
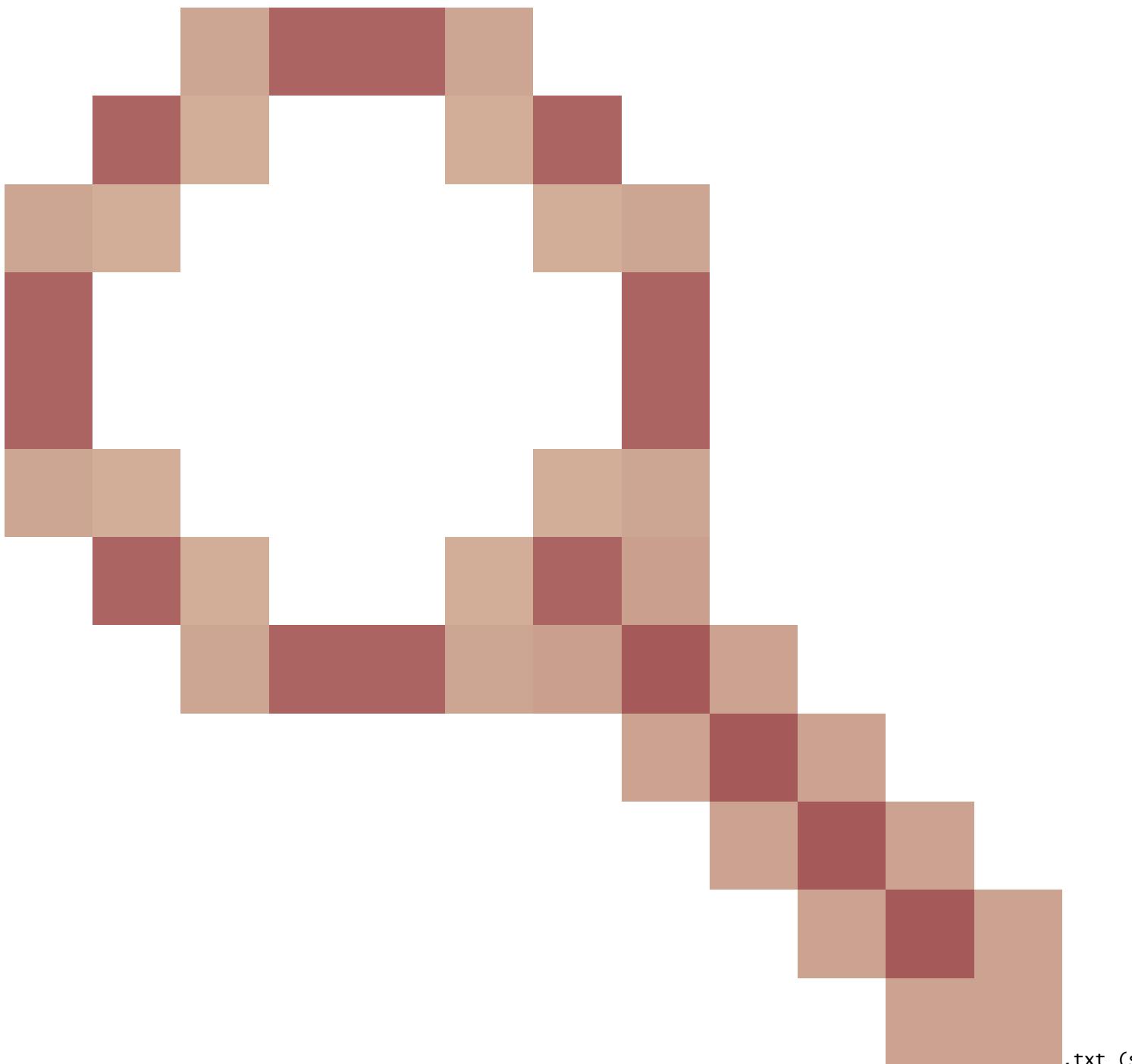
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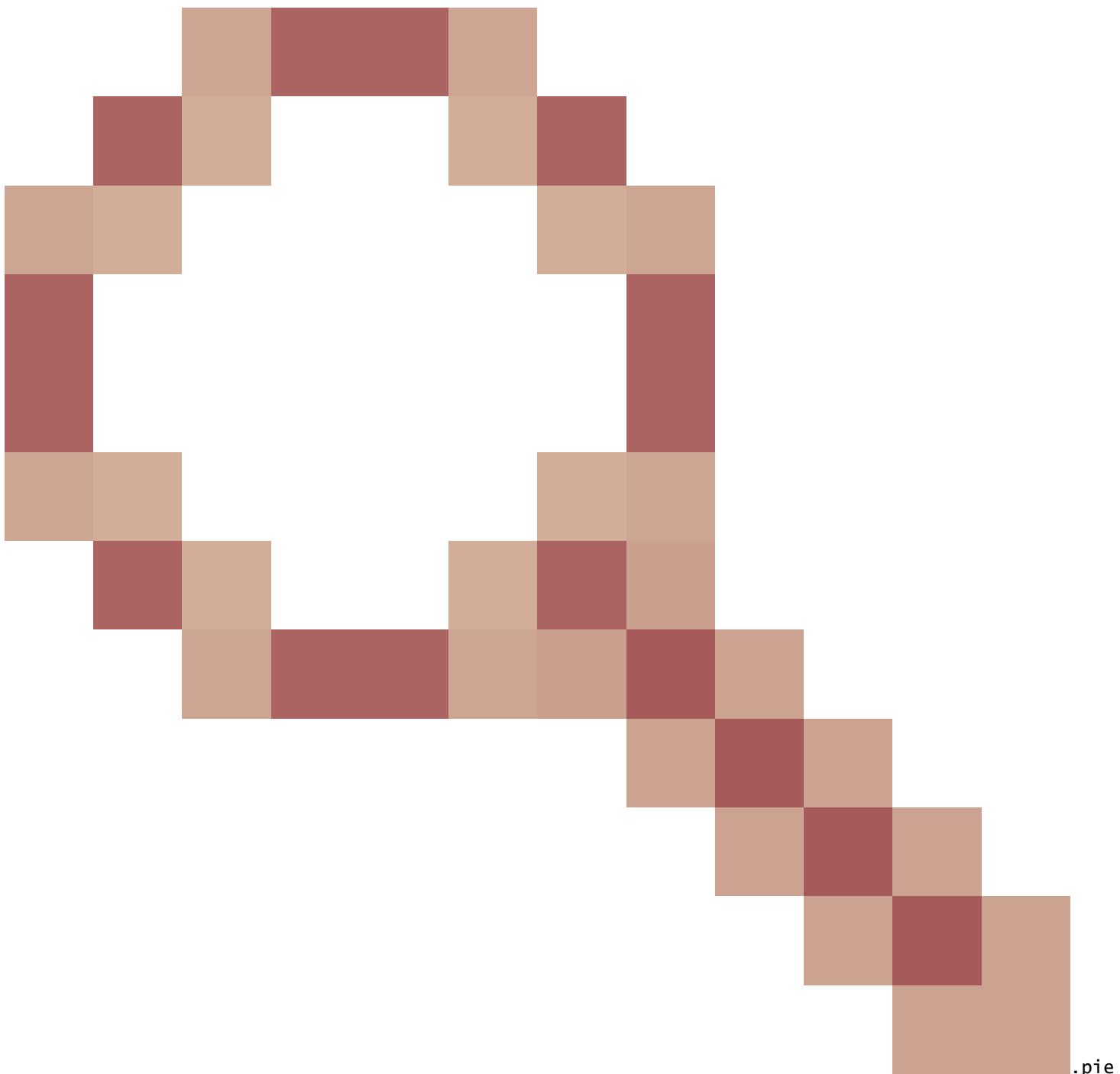
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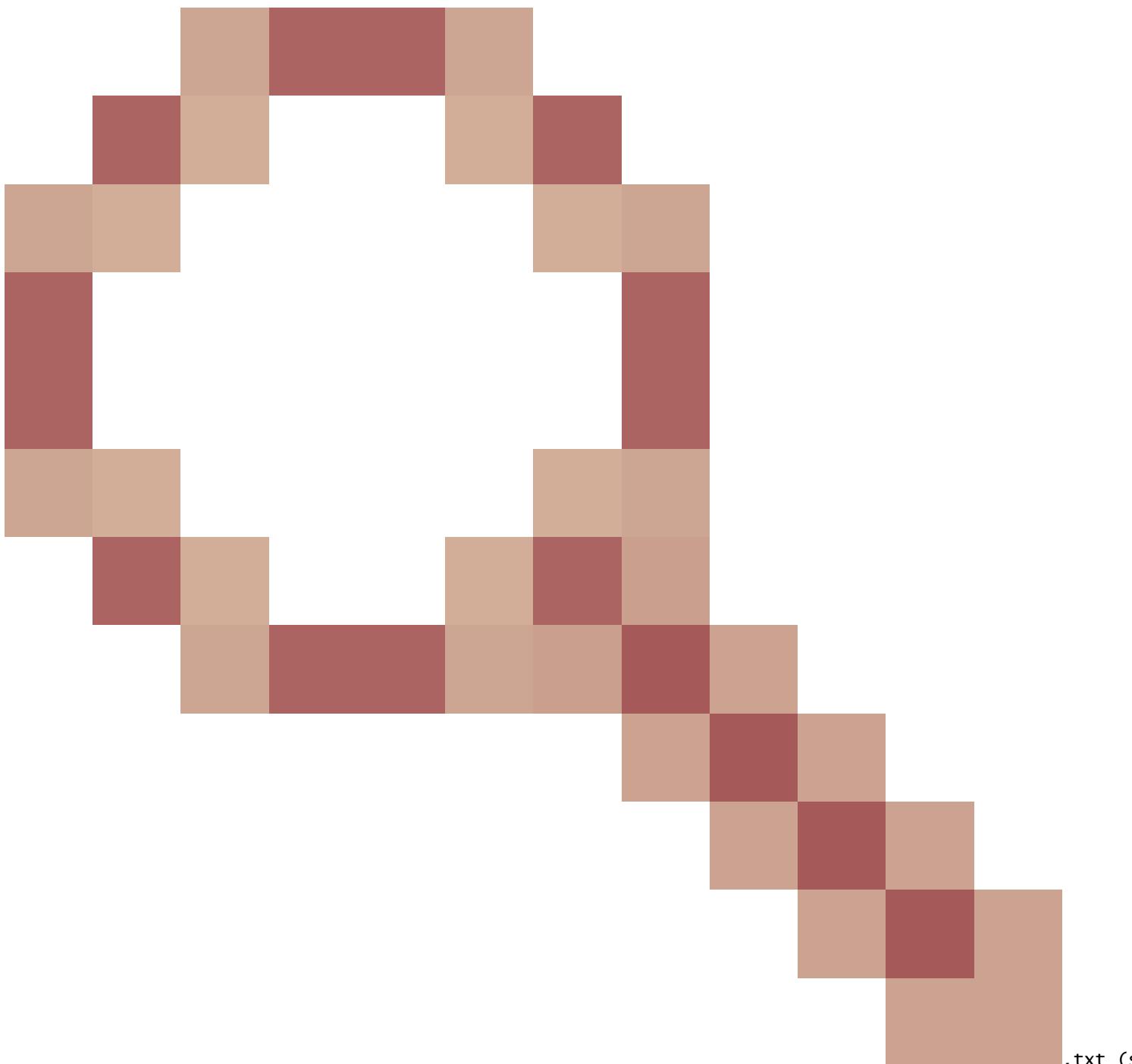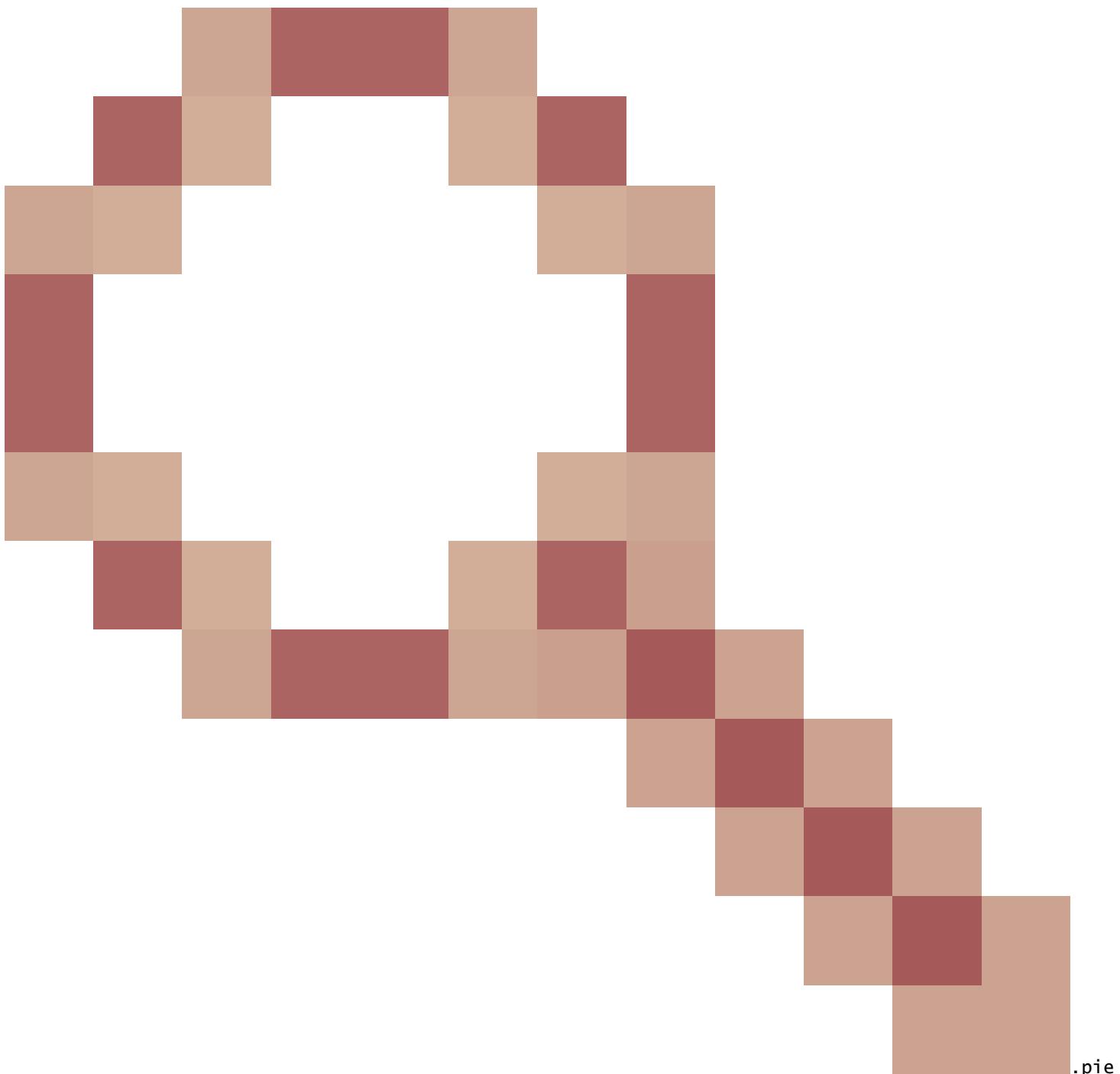
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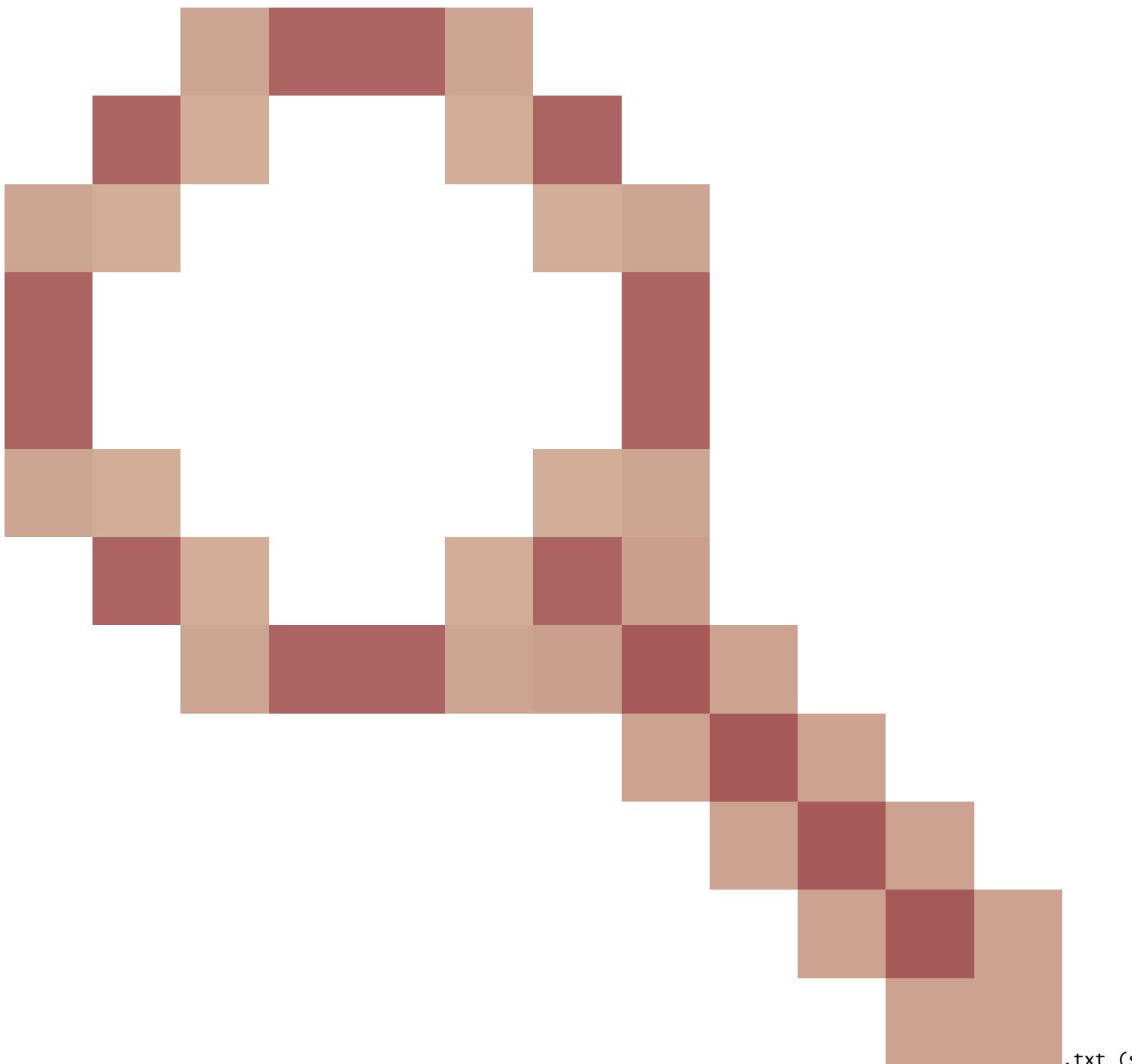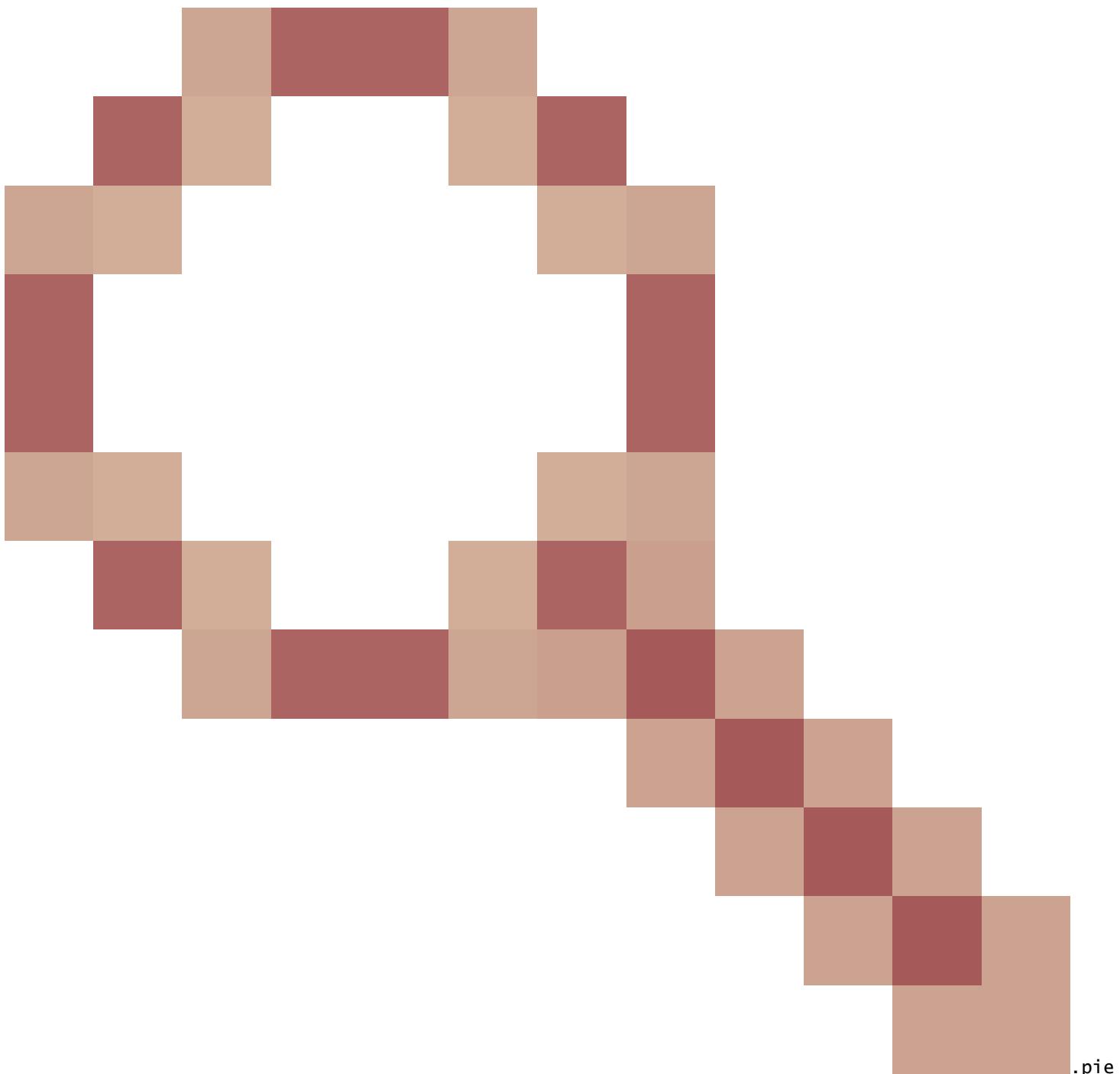
.txt (s

Info: asr9k-p-4.2.1.CSCuc47238
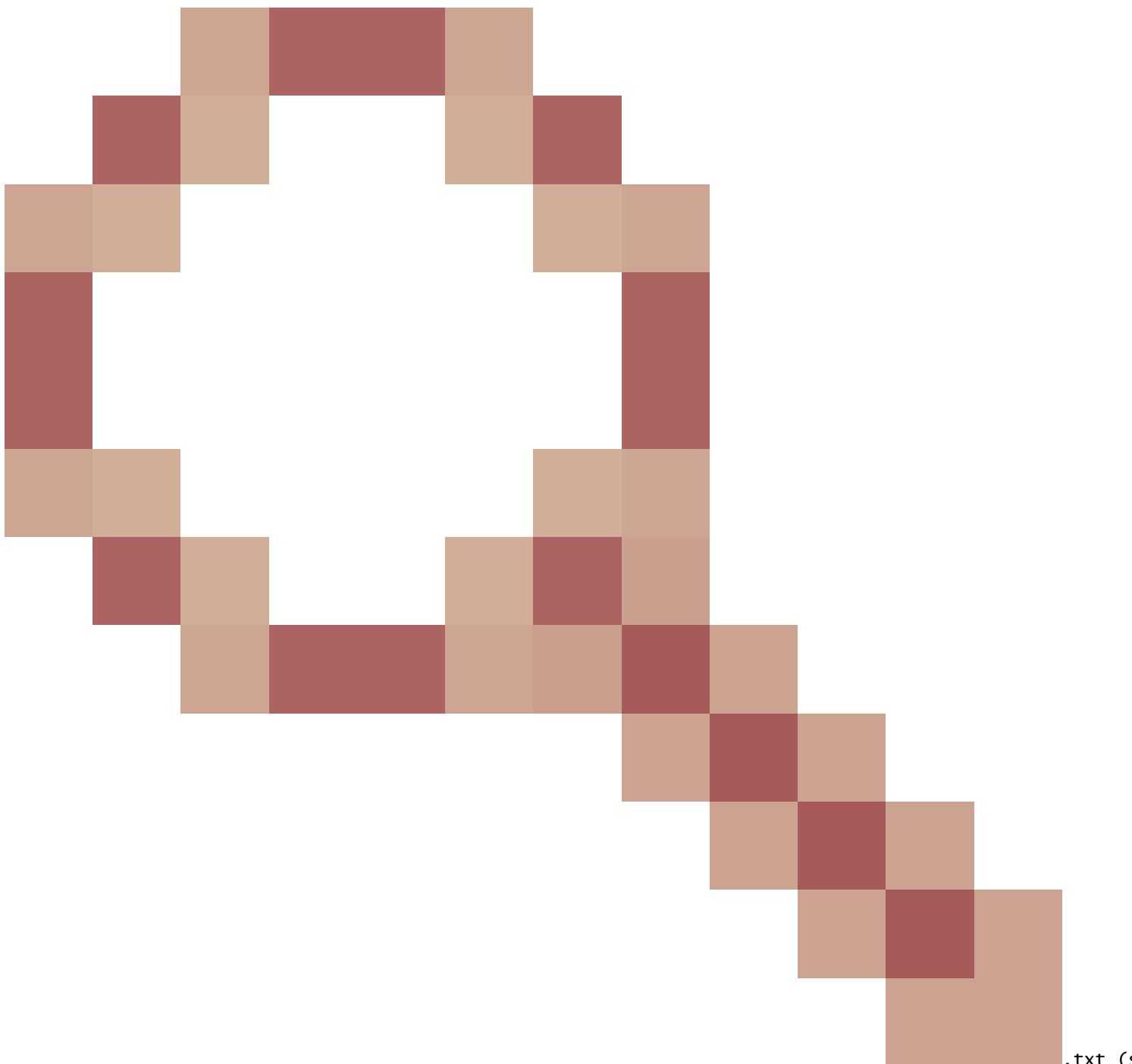
Info: asr9k-p-4.2.1.CSCuc47238.pie
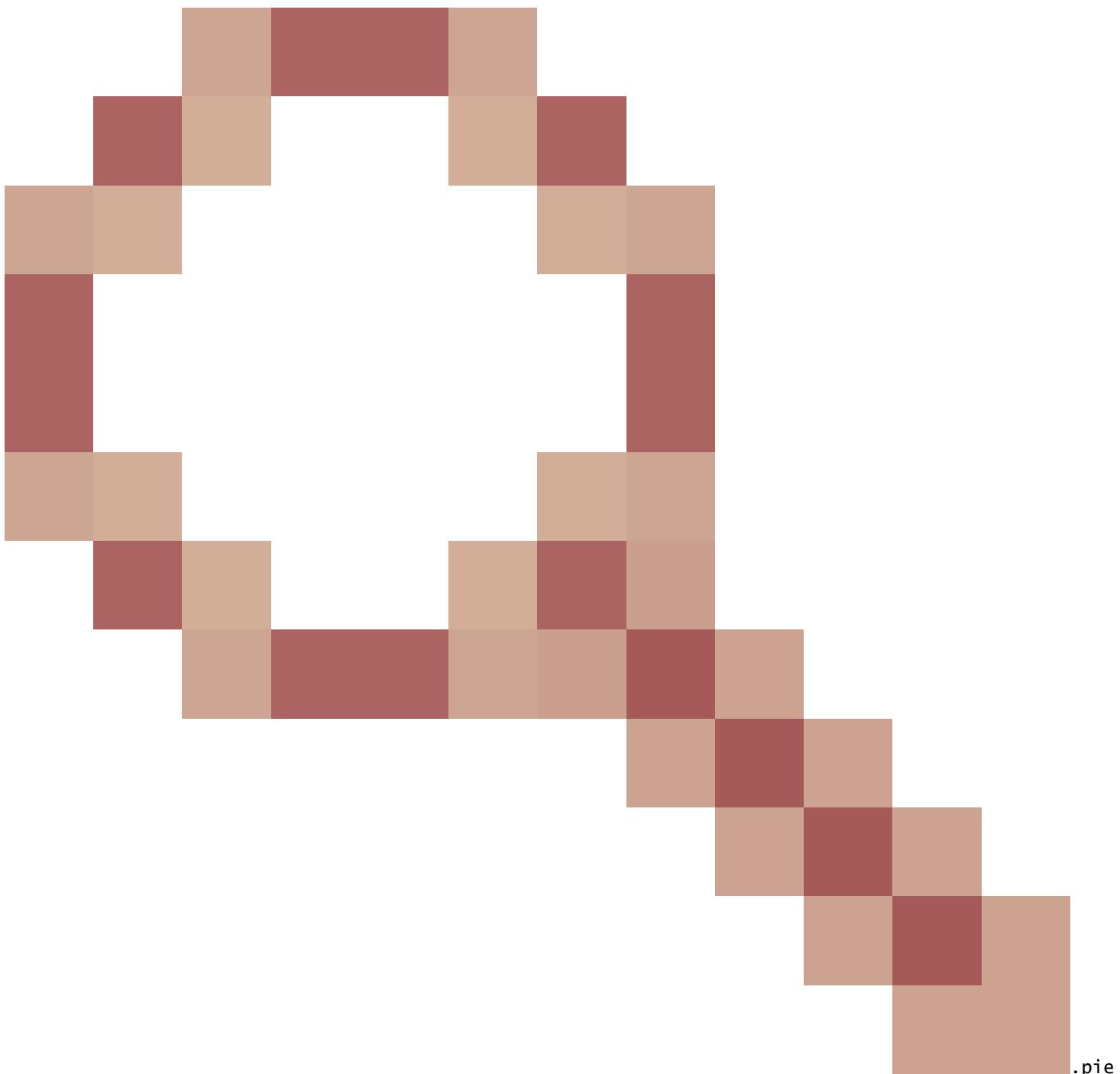
.txt (s

Info: asr9k-p-4.2.1.CSCuc47635

Info: asr9k-p-4.2.1.[CSCuc47635](.).pie
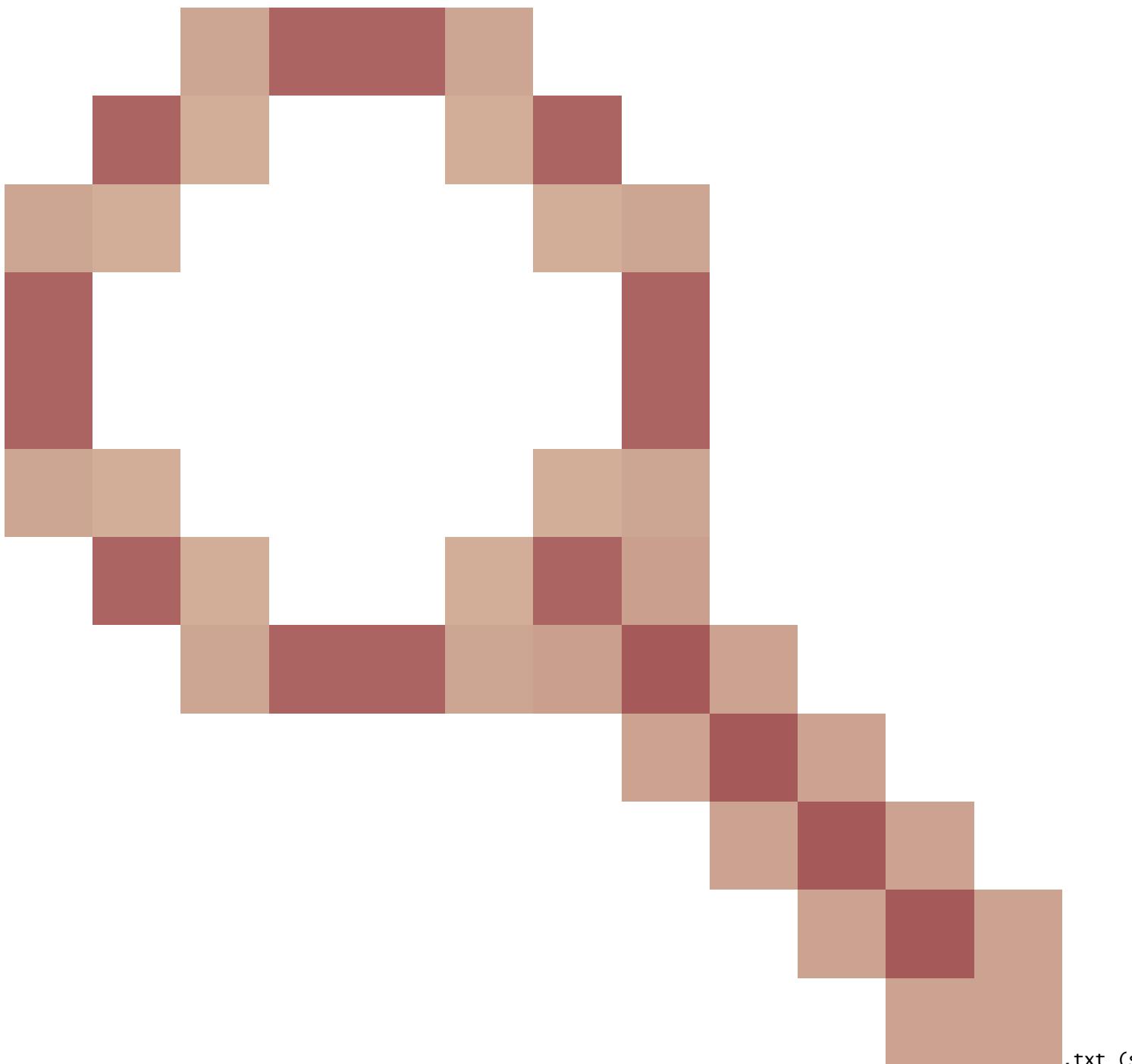
.txt (s

Info: asr9k-p-4.2.1.CSCuc49627
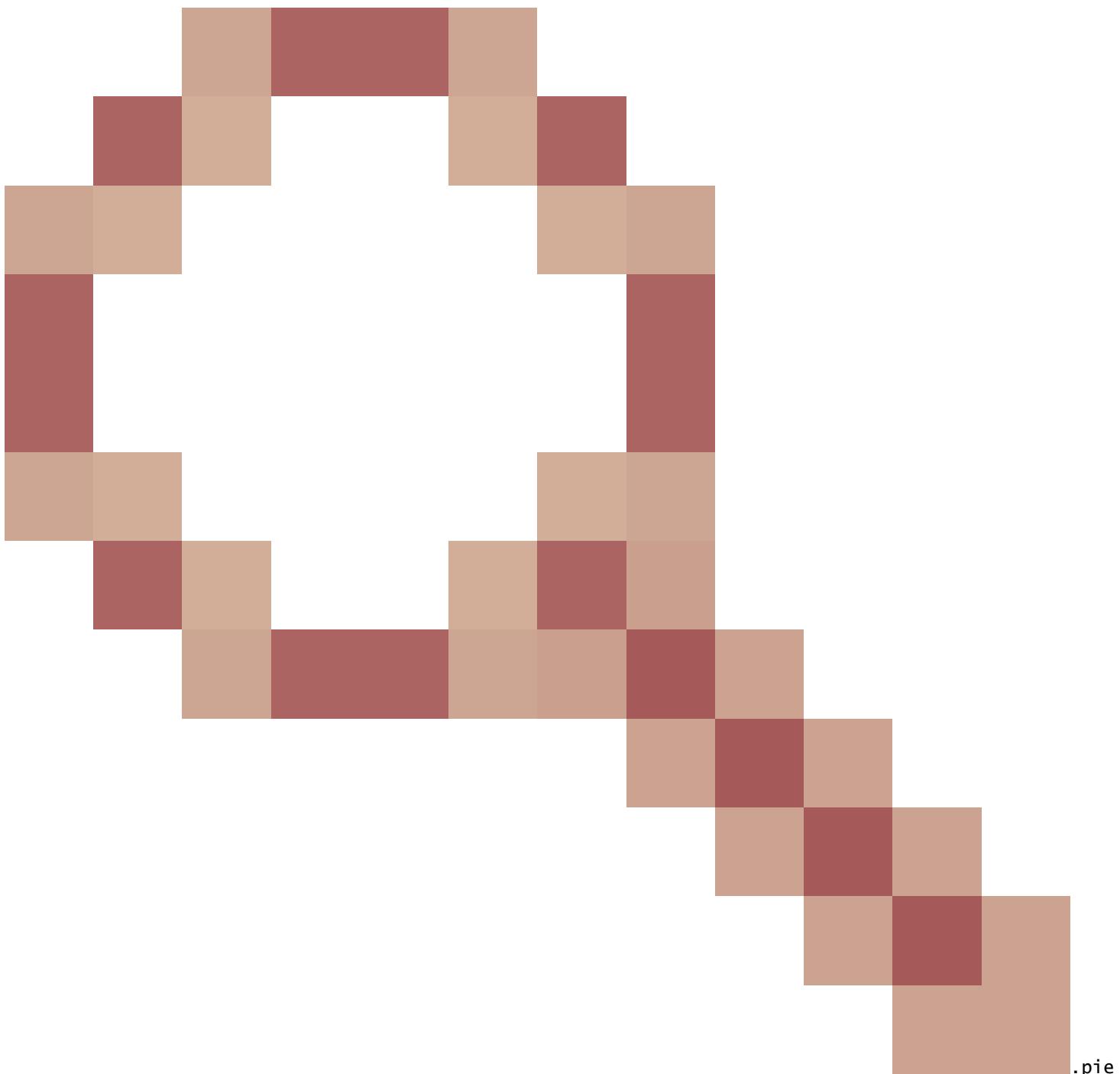
Info: asr9k-p-4.2.1.CSCuc49627.pie
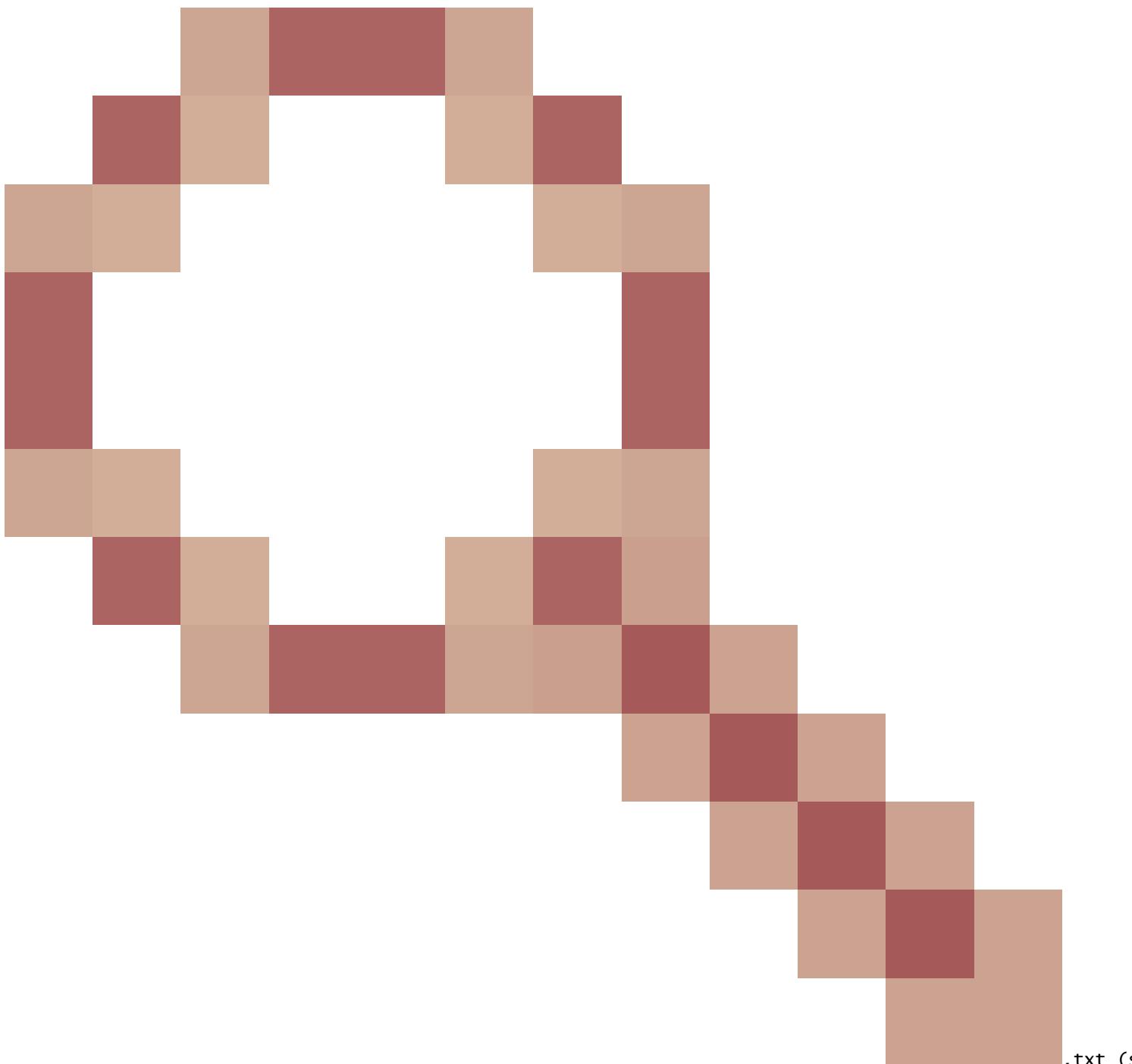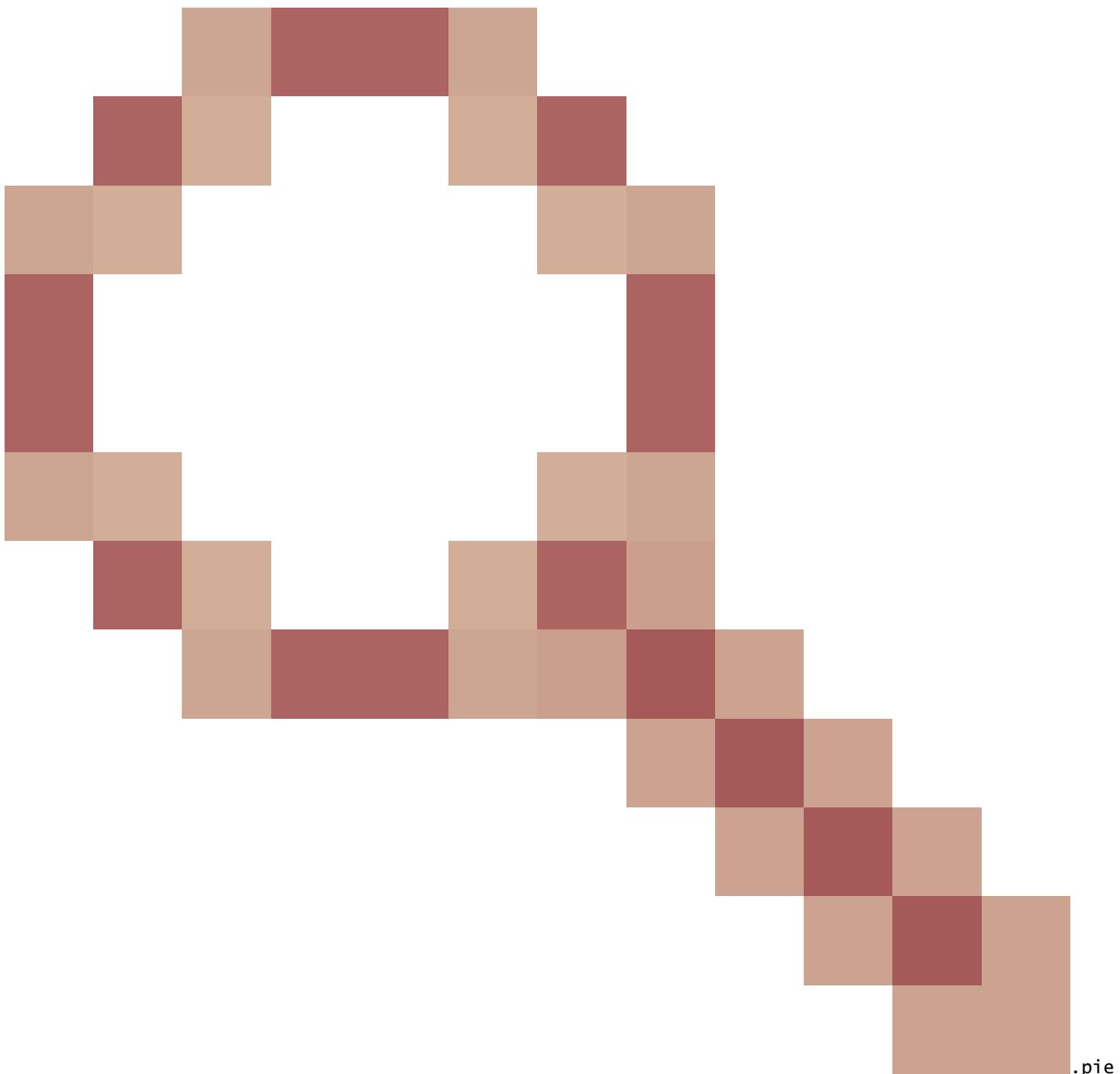
.txt (s

Info: asr9k-p-4.2.1.CSCuc56676

Info: asr9k-p-4.2.1.CSCuc56676.pie
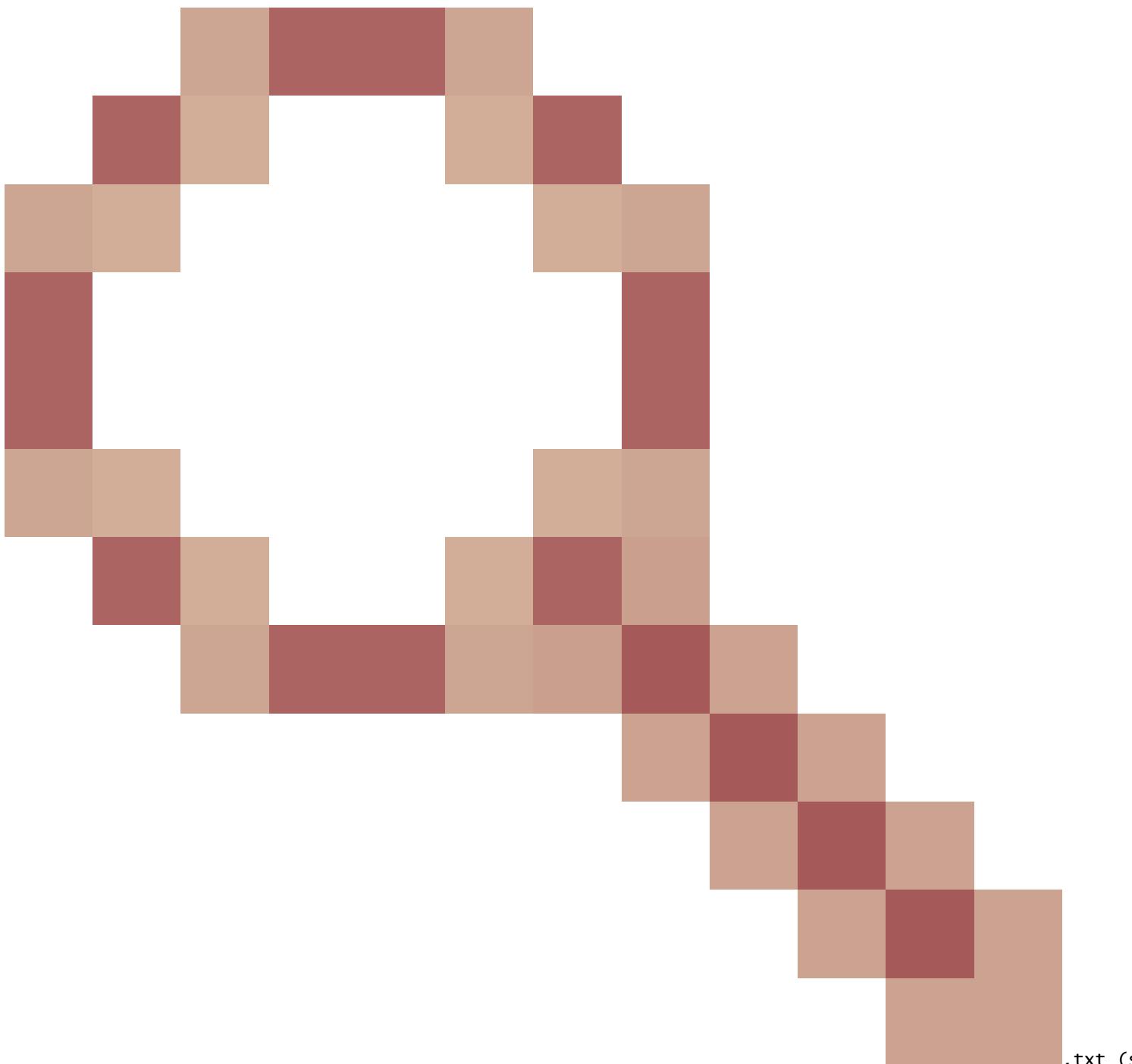
.txt (s

Info: asr9k-p-4.2.1.CSCuc62781
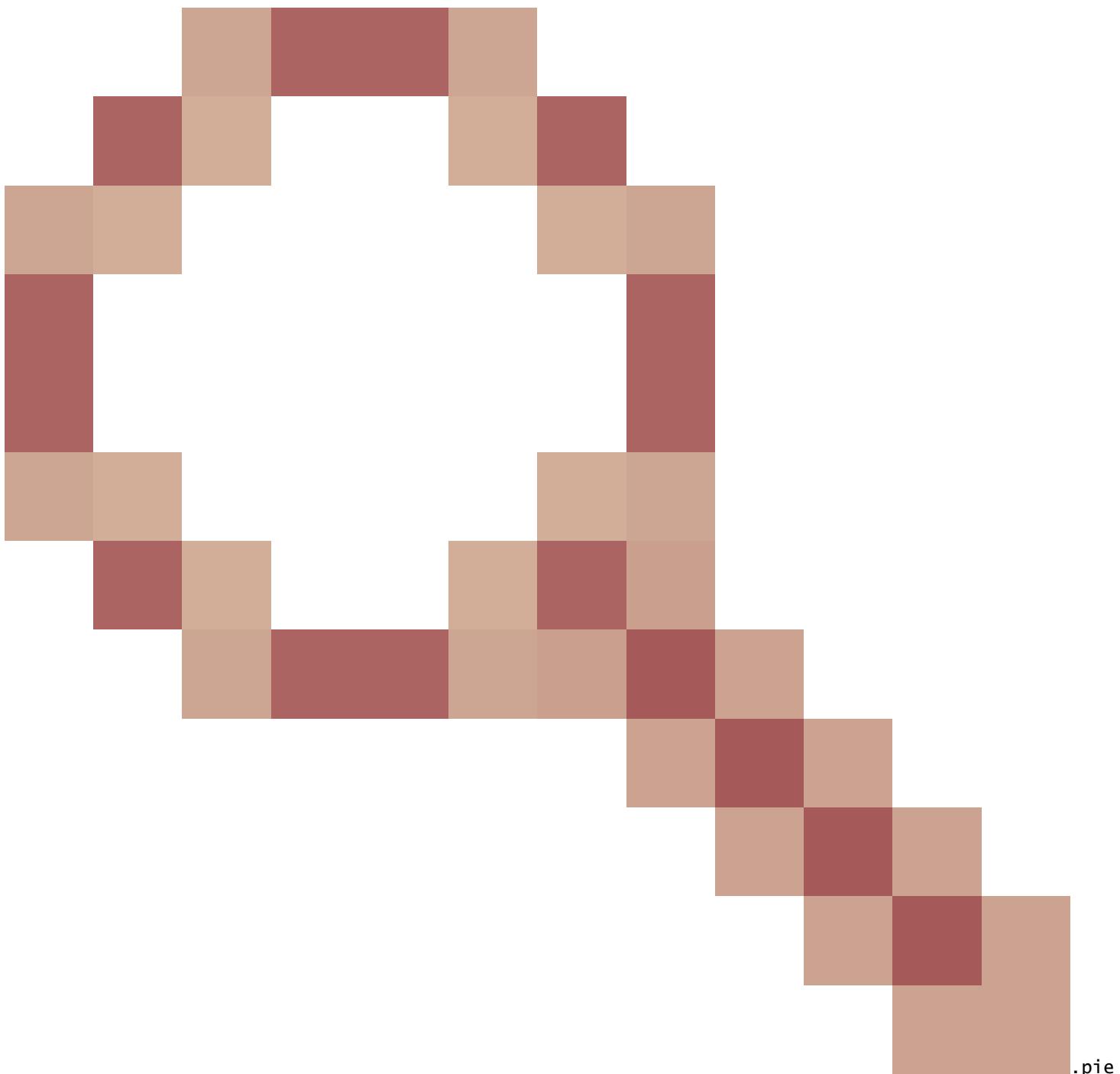
Info: asr9k-p-4.2.1.[CSCuc62781](#).pie
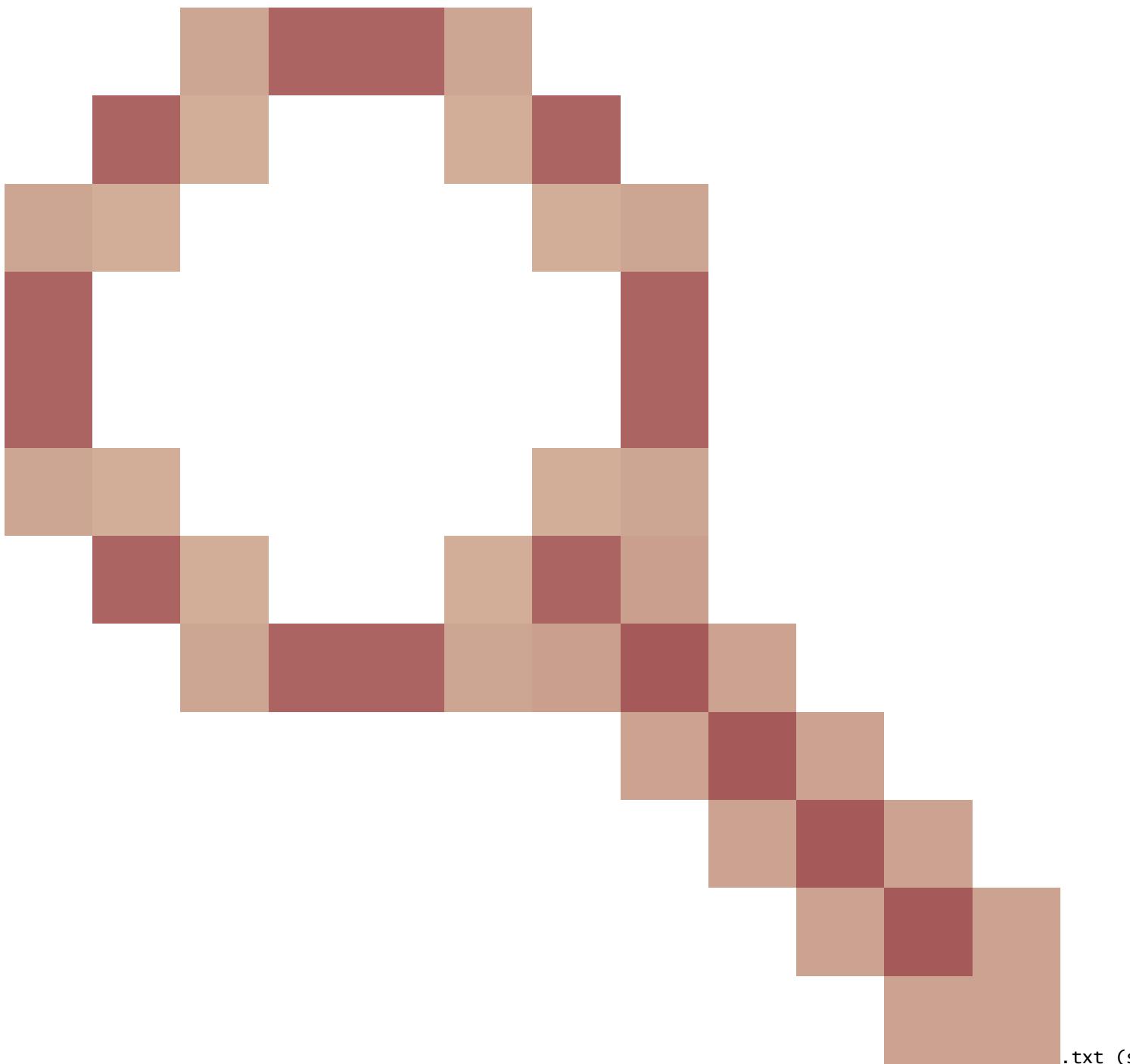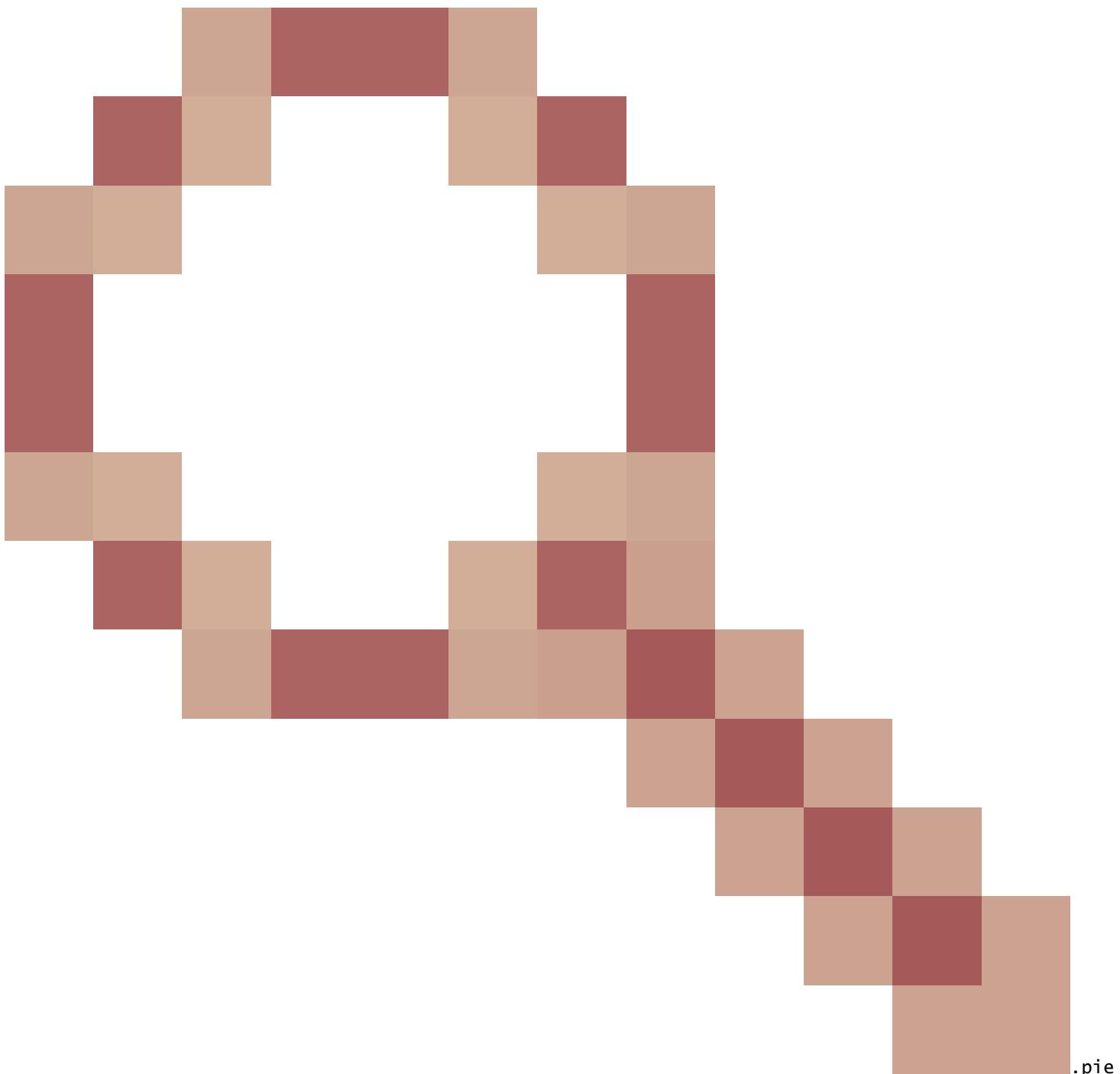
.txt (s

Info: asr9k-p-4.2.1.CSCuc74345
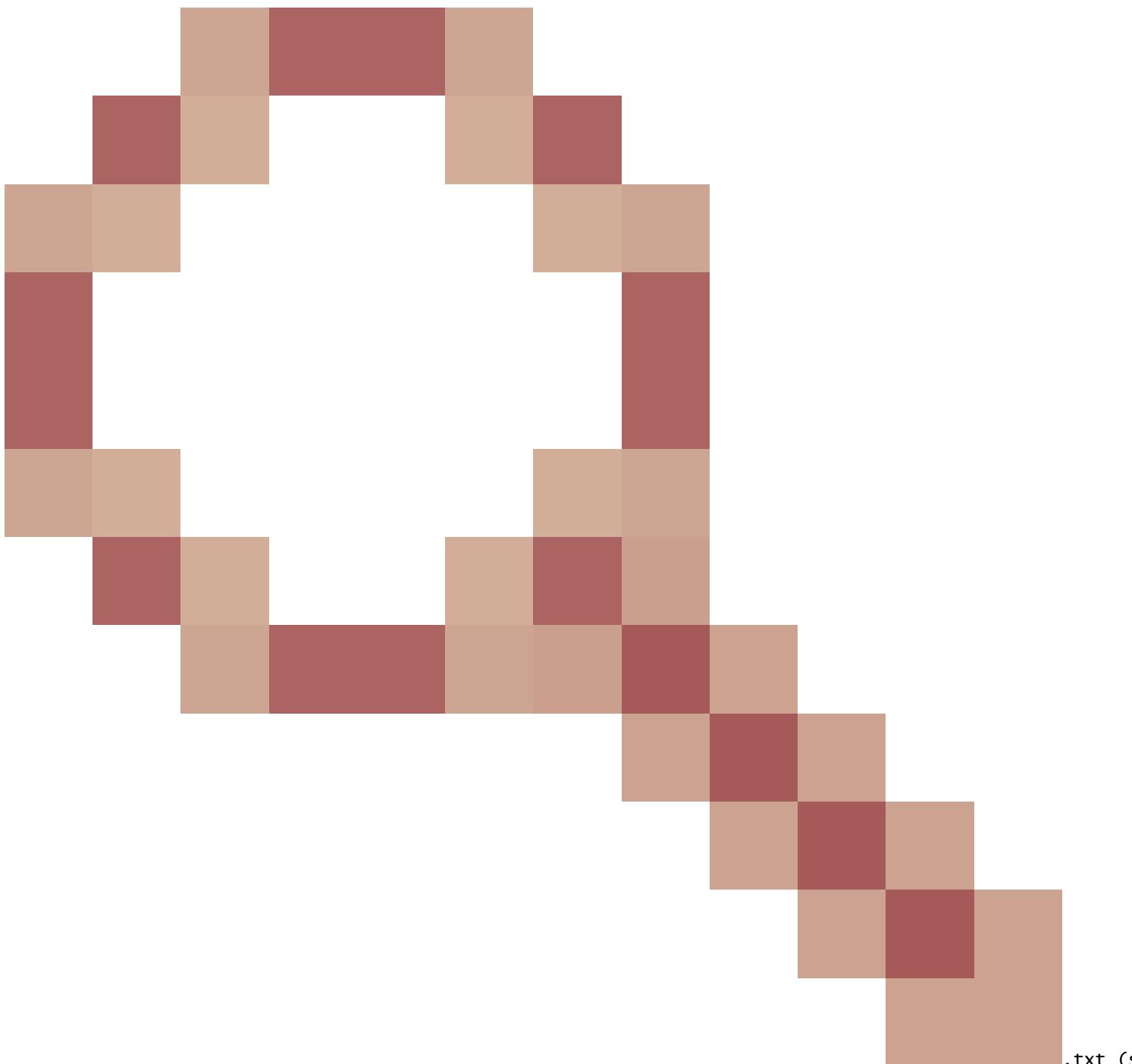
Info: asr9k-p-4.2.1.CSCuc74345.pie
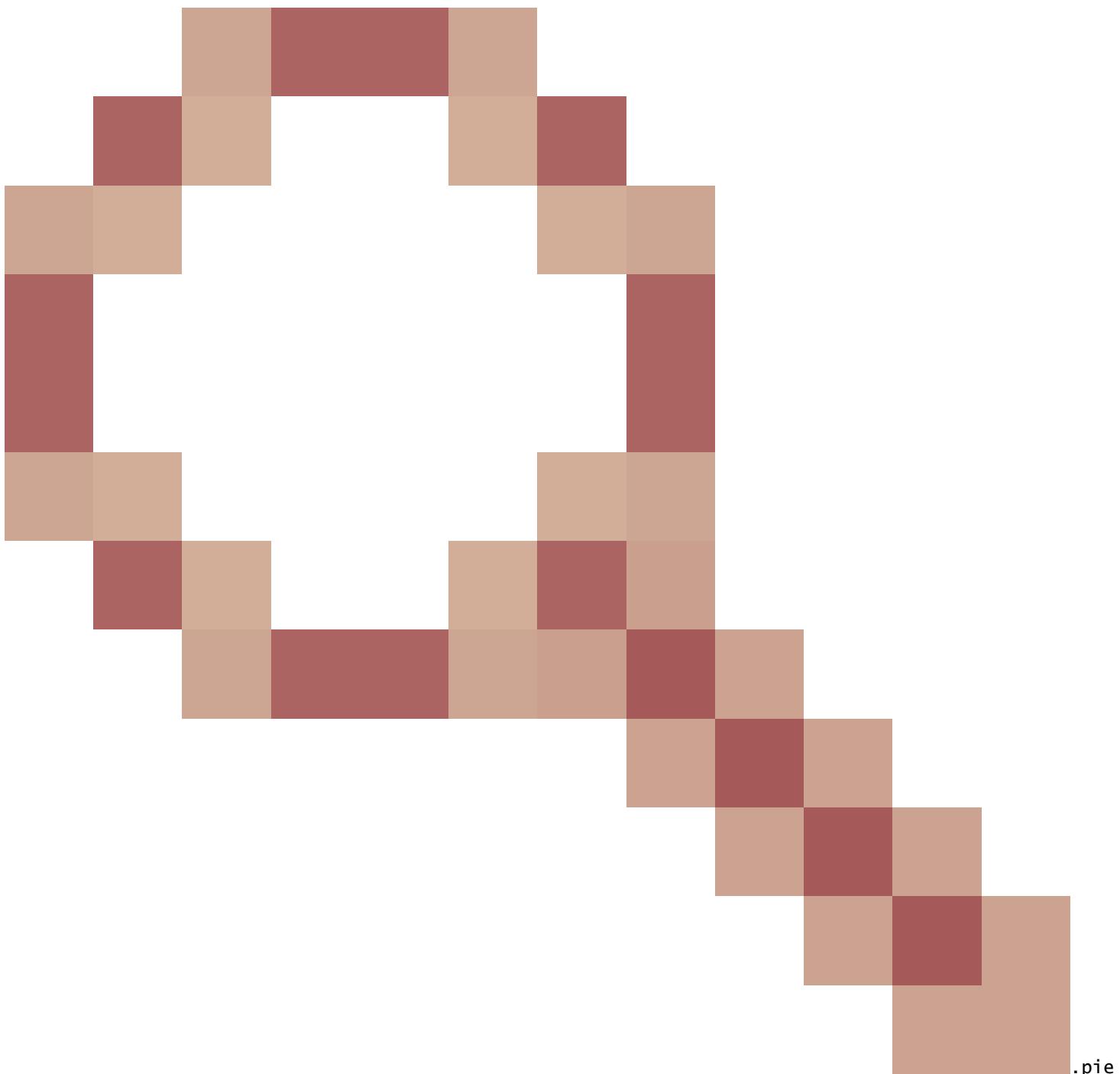
Info: asr9k-p-4.2.1.[CSCuc78780]

Info: asr9k-p-4.2.1.CSCuc78780.pie
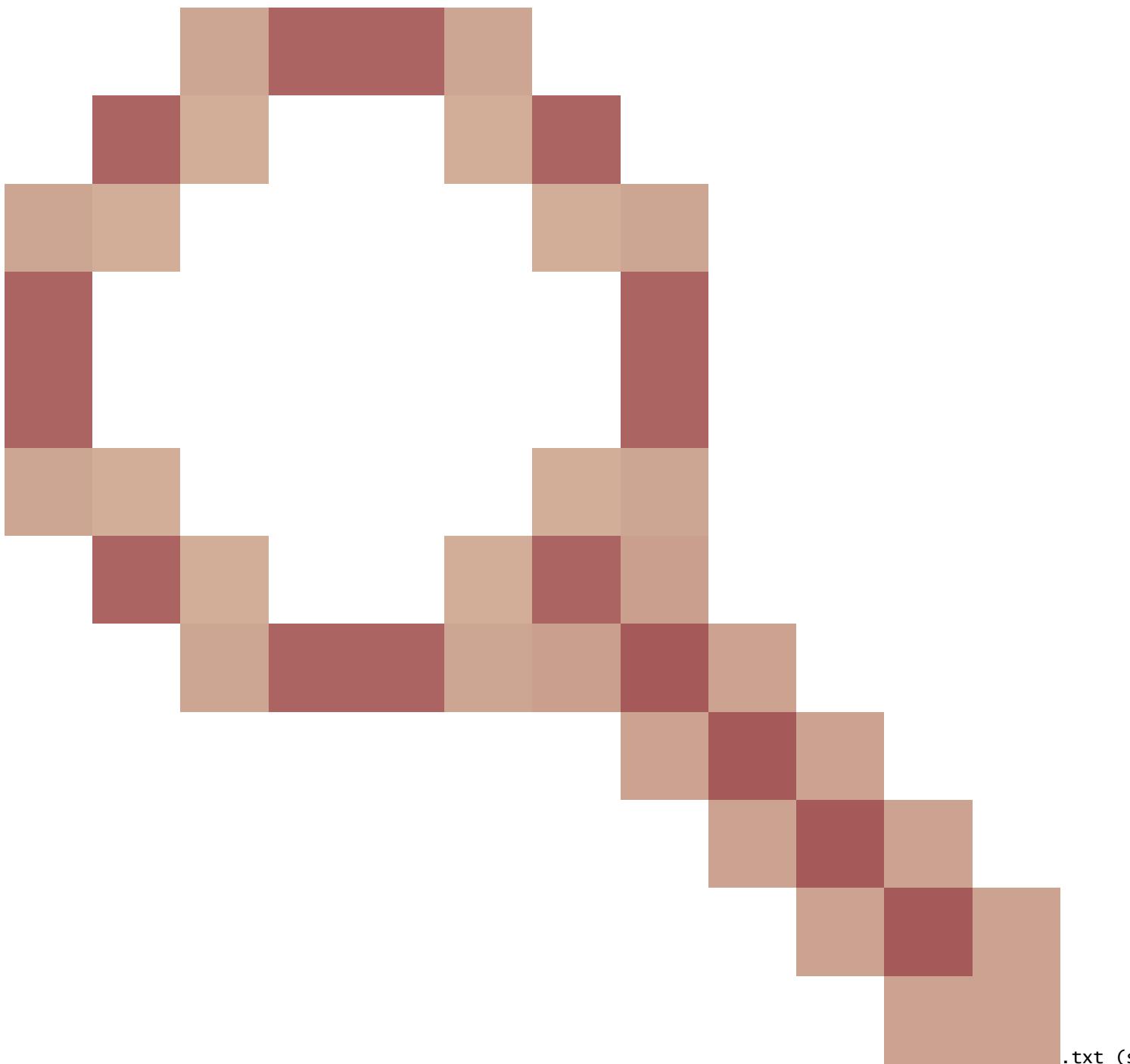
.txt (s

Info: asr9k-p-4.2.1.[CSCuc95853](#)
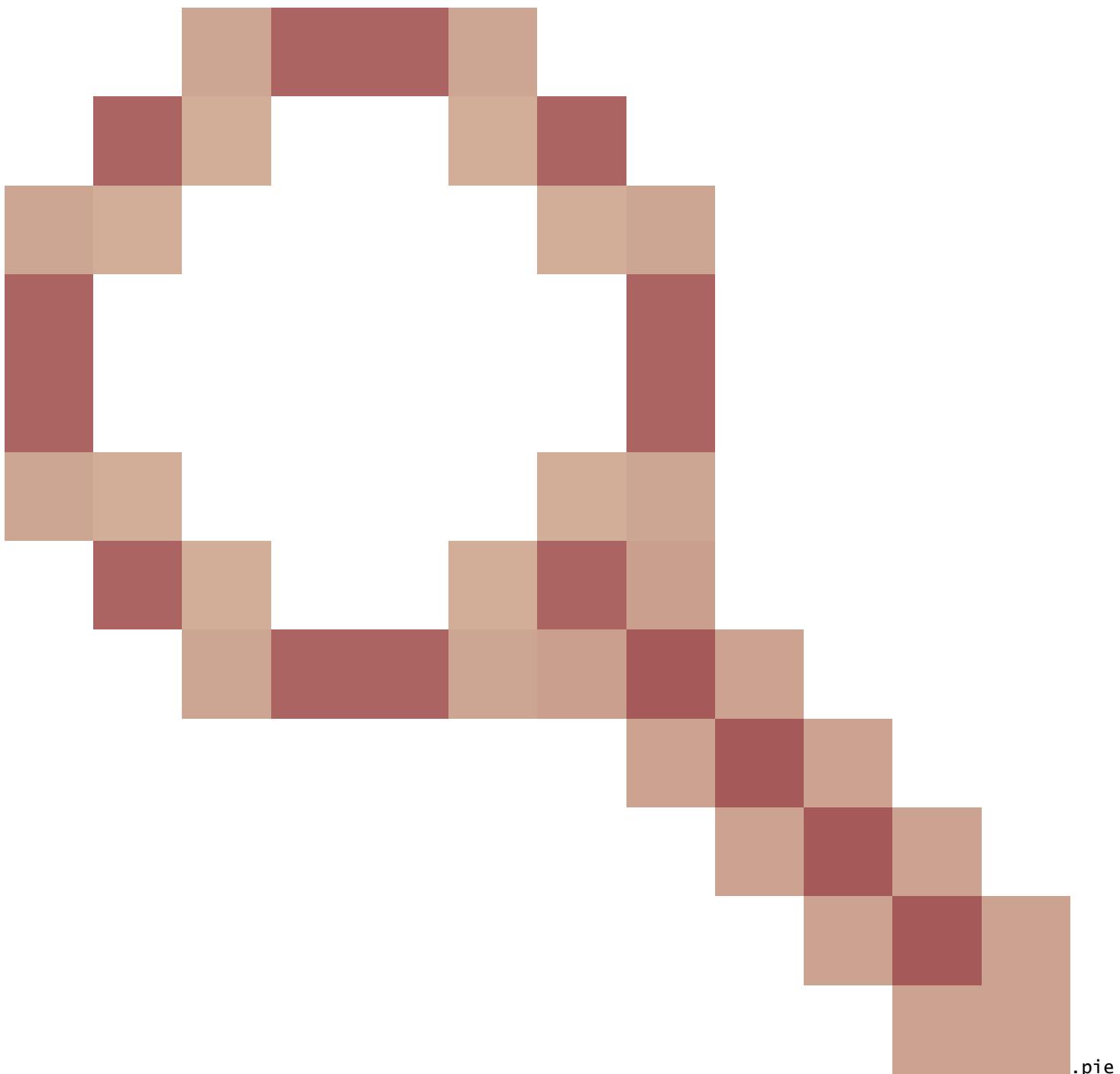
Info: asr9k-p-4.2.1.CSCuc95853.pie
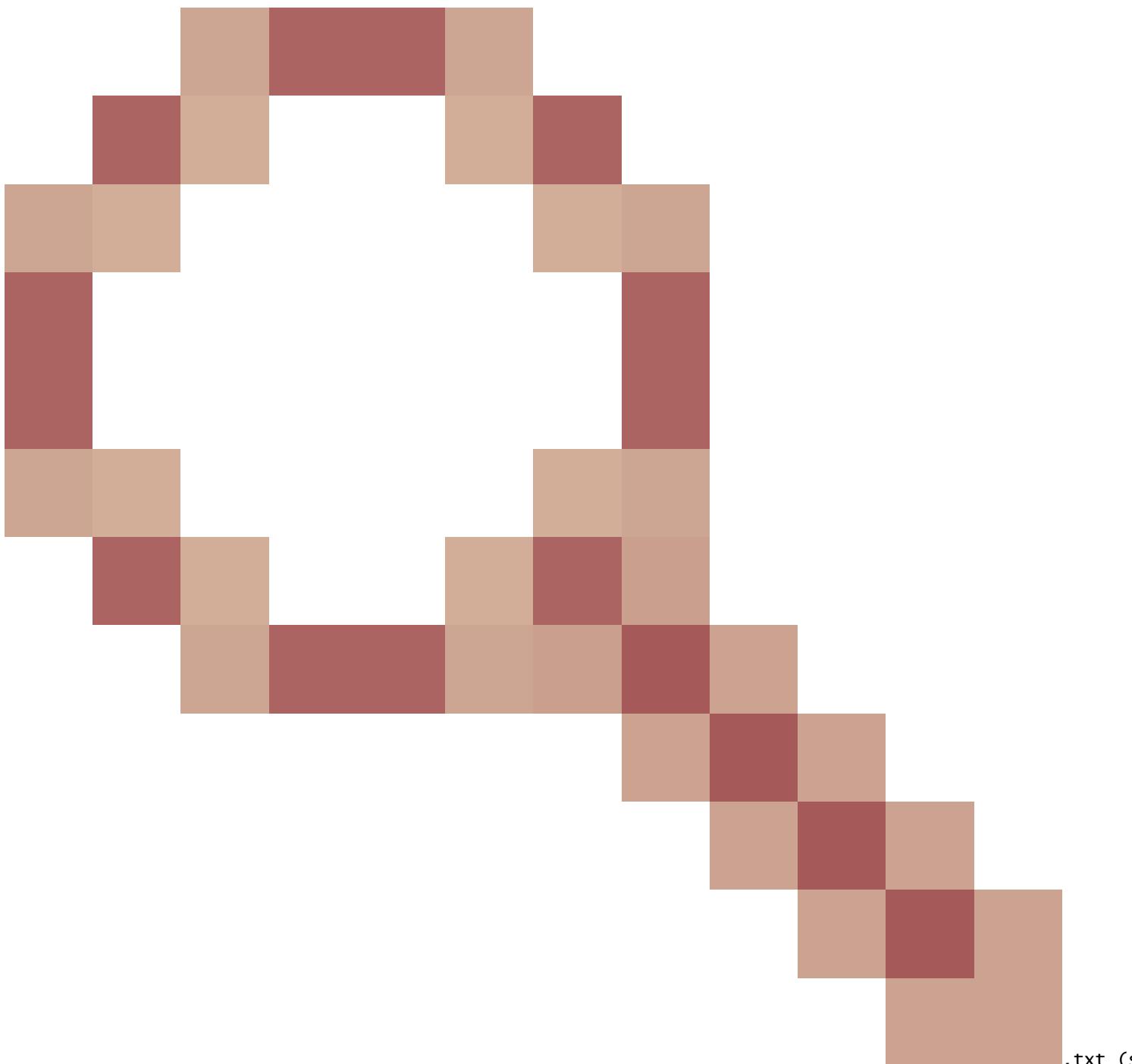
.txt (s

Info: asr9k-p-4.2.1.CSCud16267
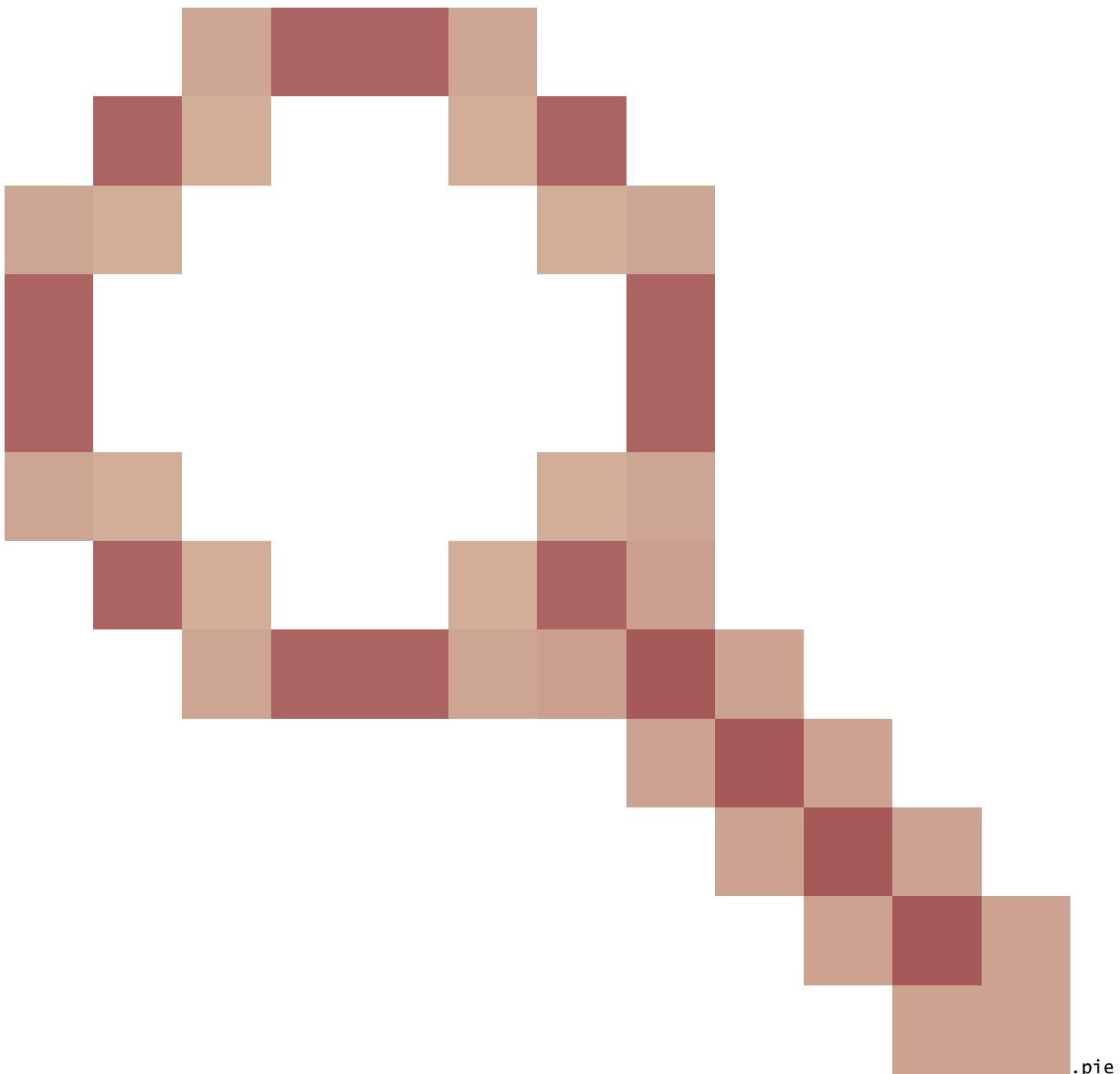
Info: asr9k-p-4.2.1.CSCud16267.pie
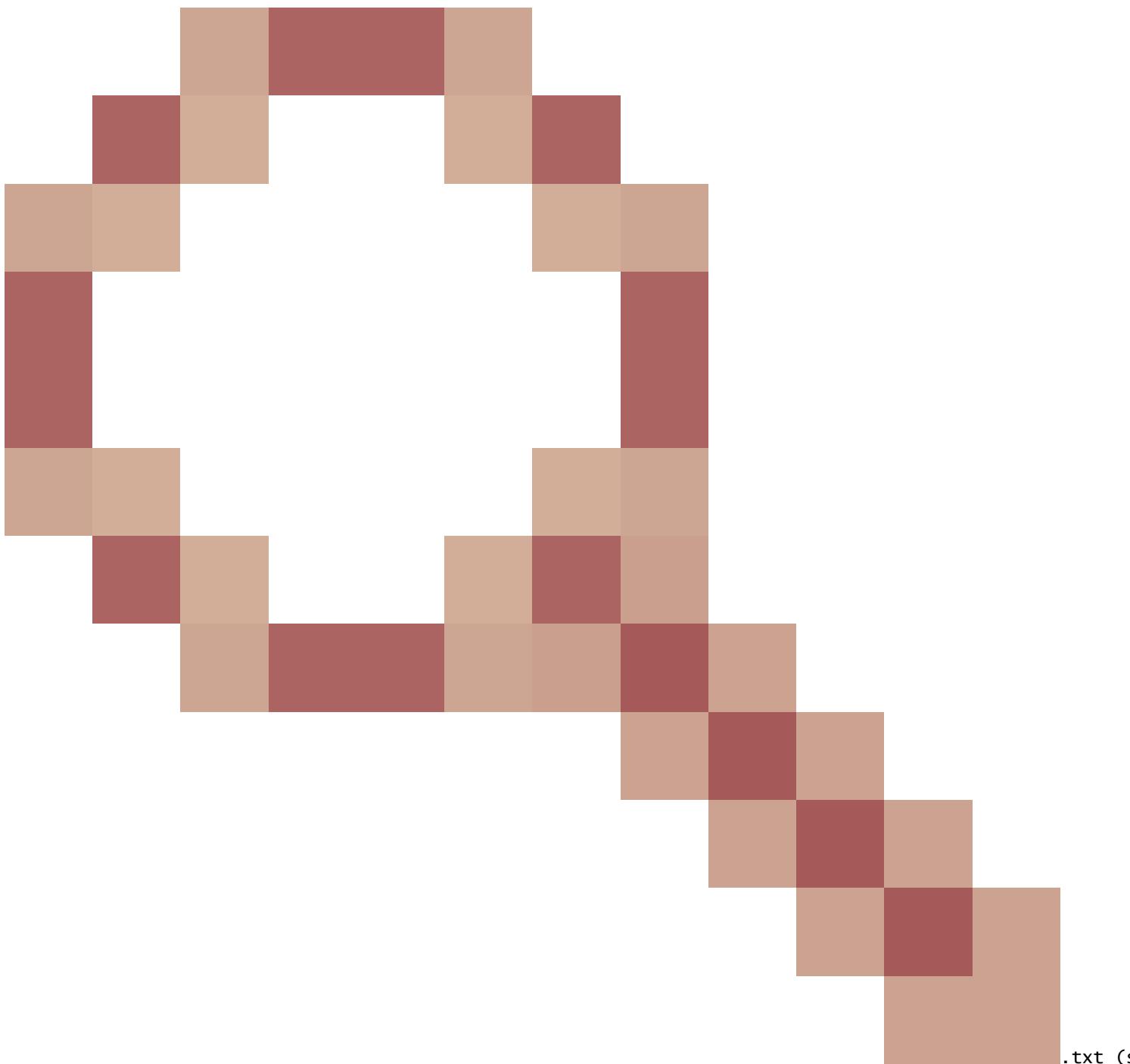
.txt (s

Info: asr9k-p-4.2.1.CSCud21216
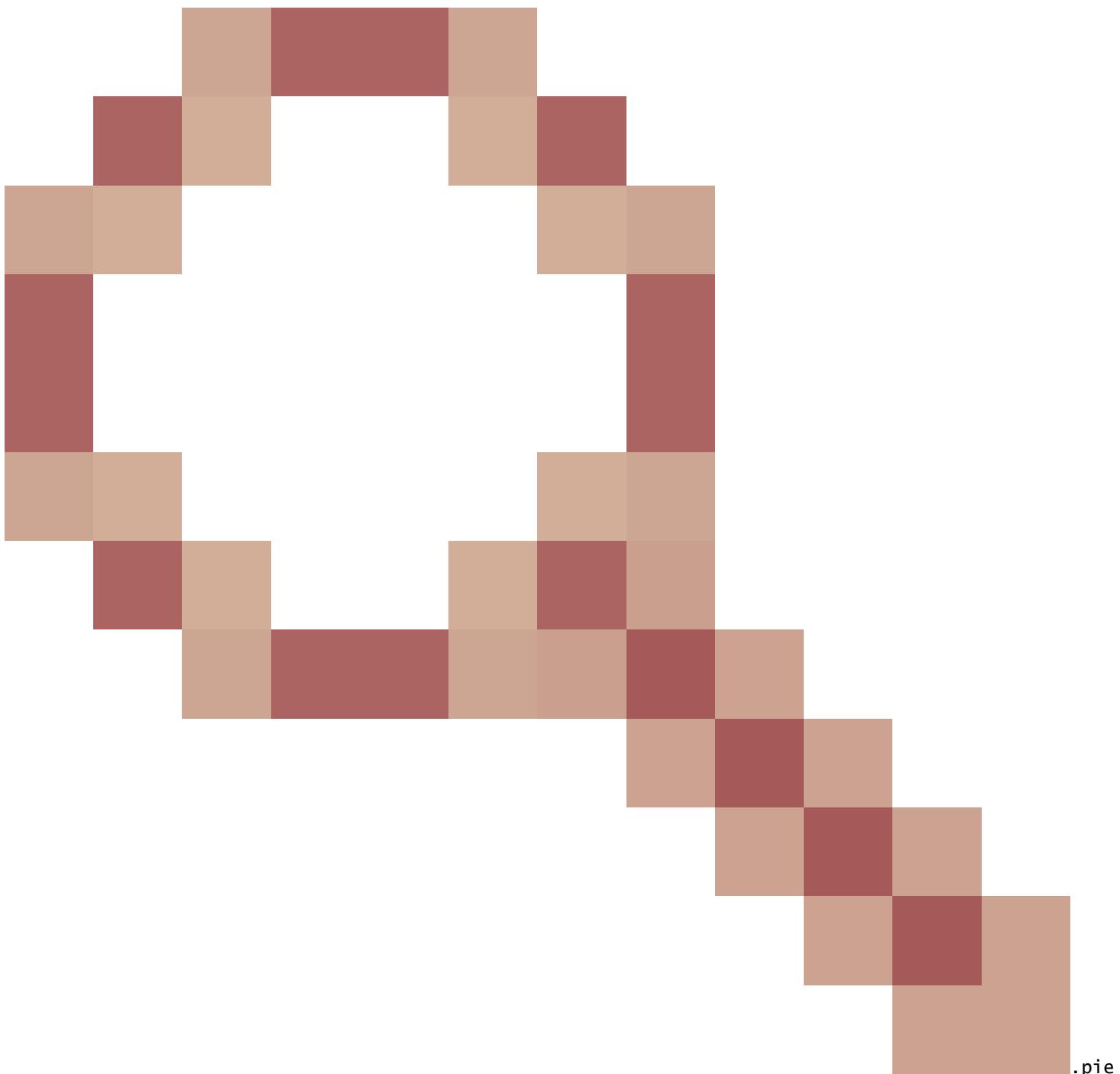
Info: asr9k-p-4.2.1.CSCud21216.pie
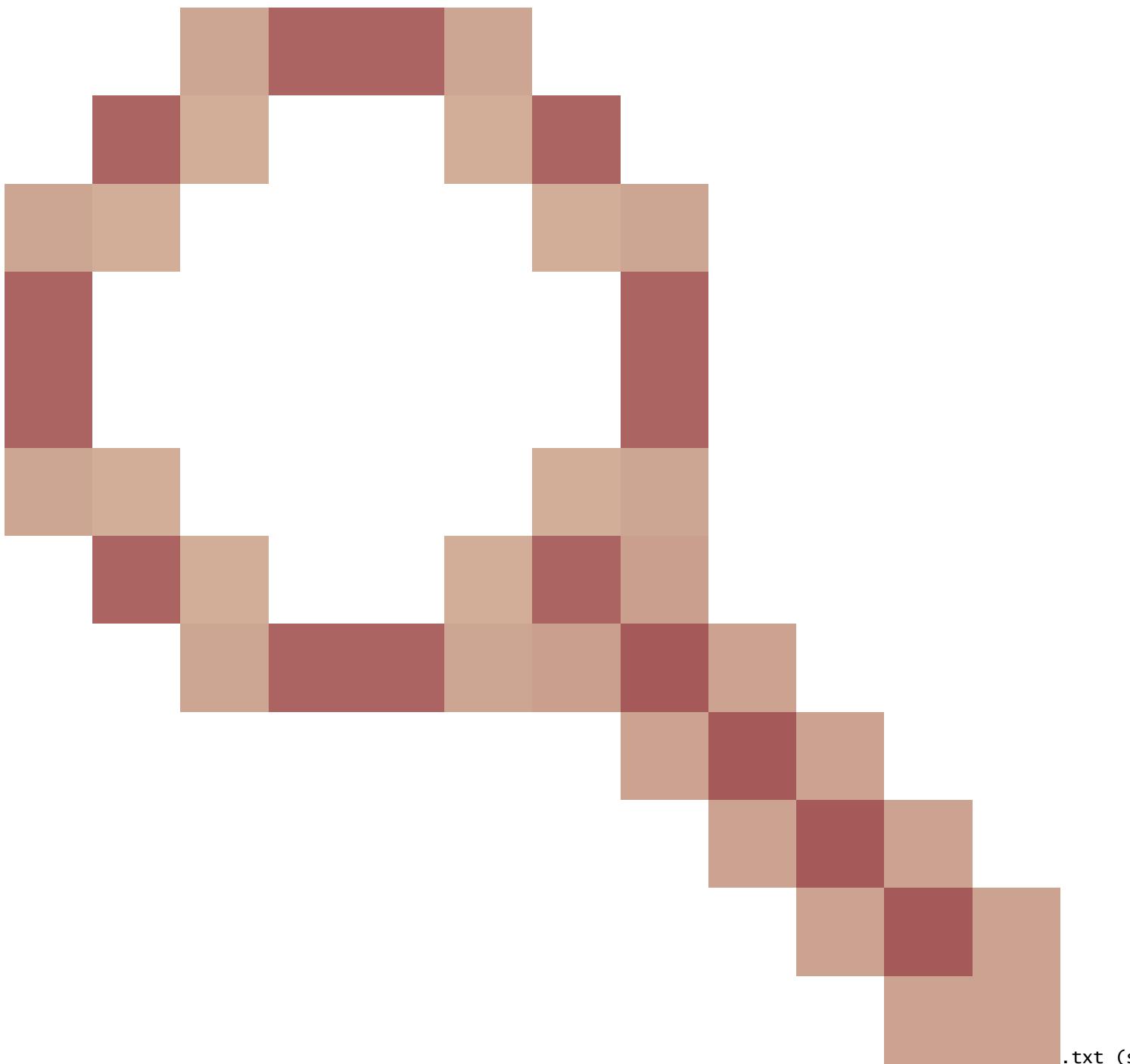
Info: asr9k-p-4.2.1.CSCud39827.txt (s
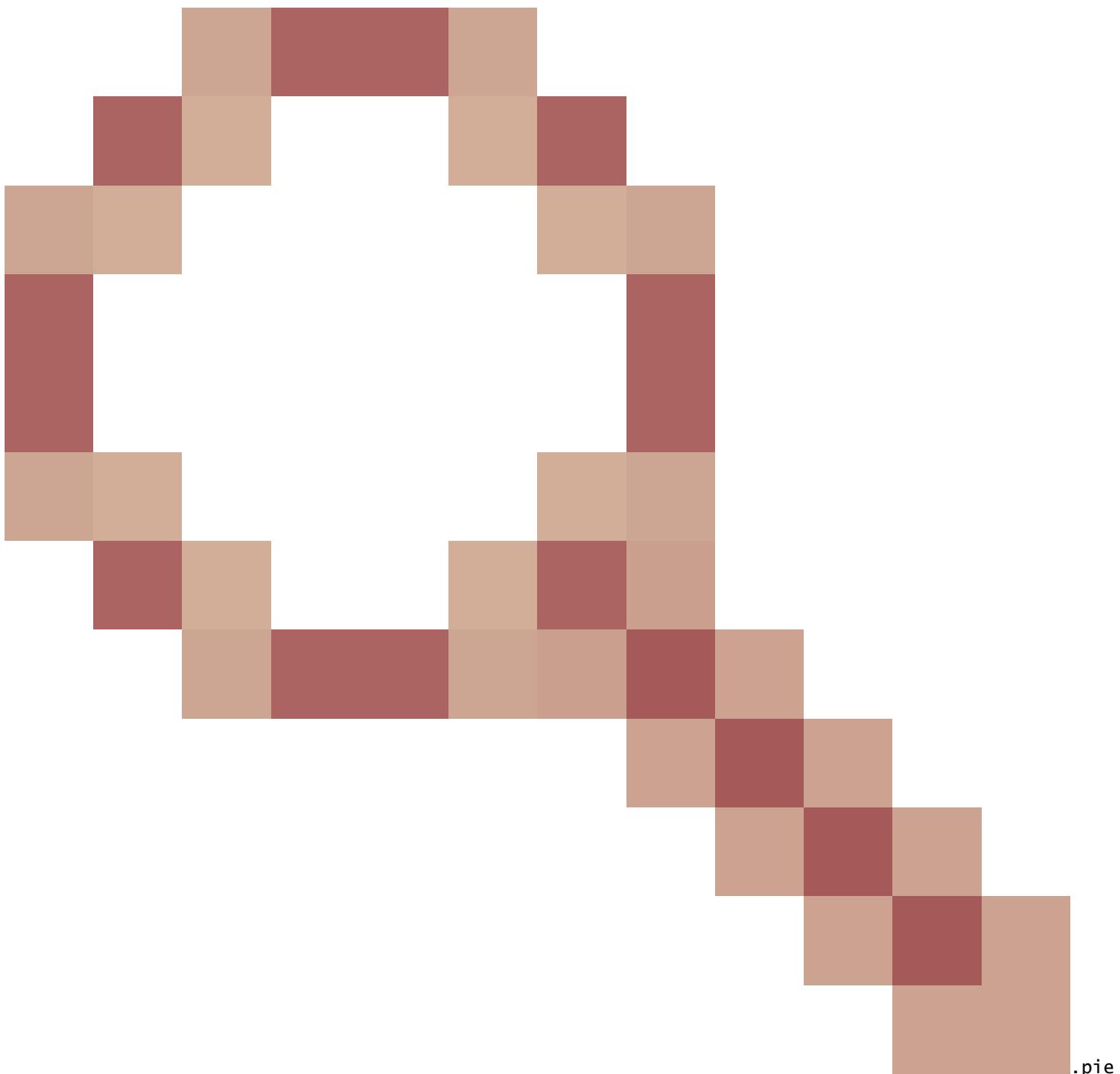
Info: asr9k-p-4.2.1.[CSCud39827].pie
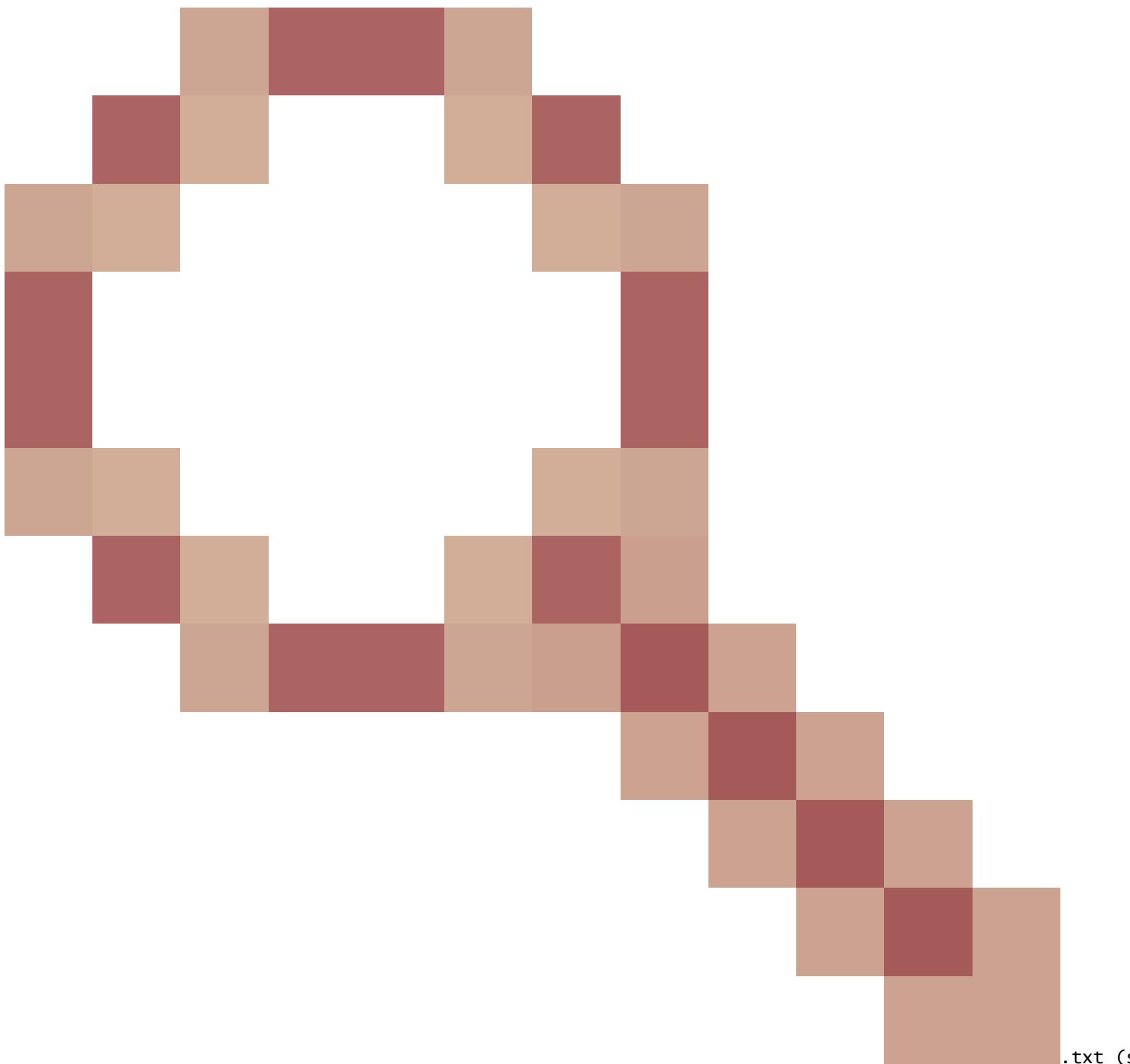
Info: asr9k-p-4.2.1.[CSCud59391].txt (s...

Info: asr9k-p-4.2.1.CSCud59391.pie

.txt (s
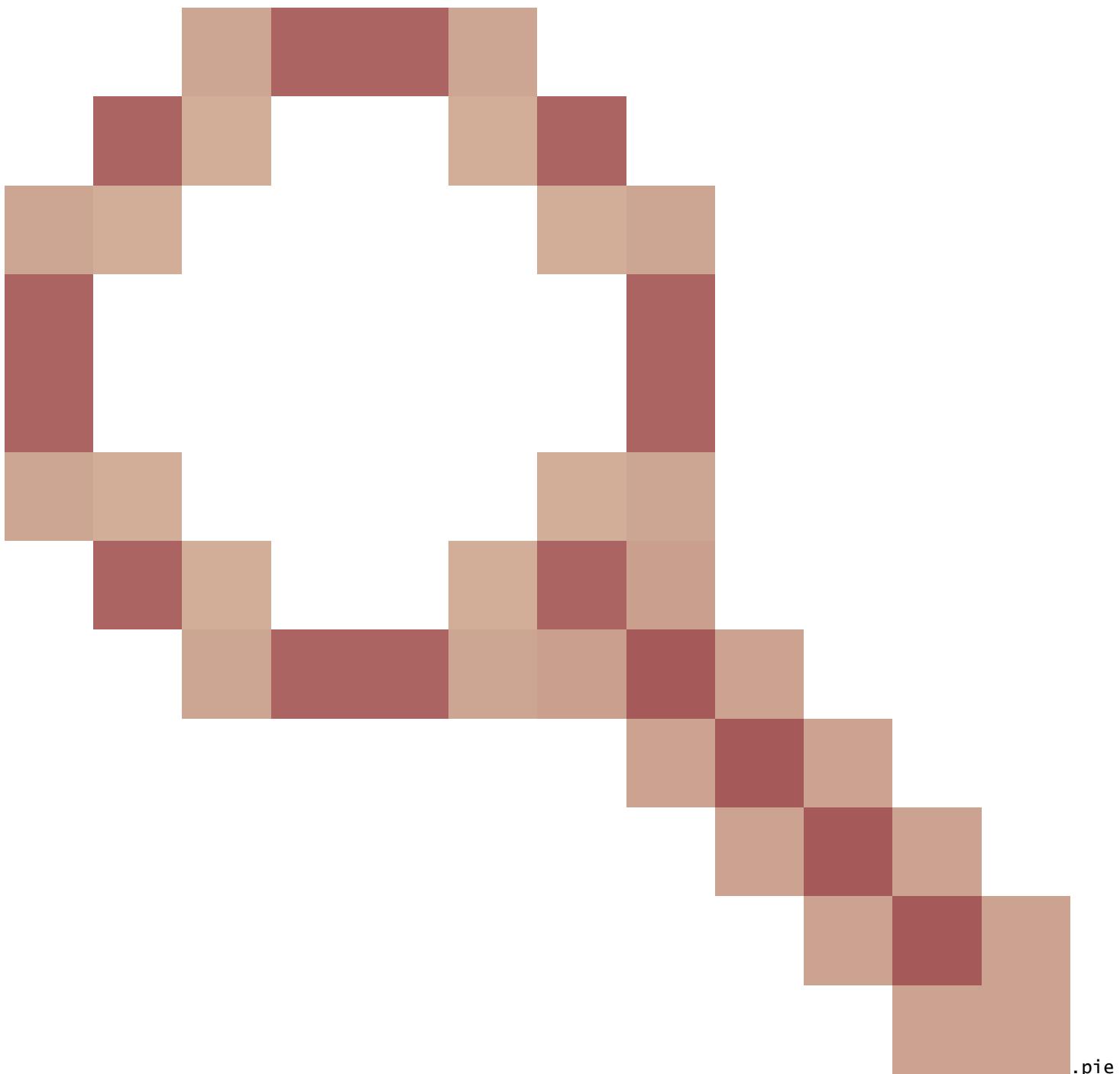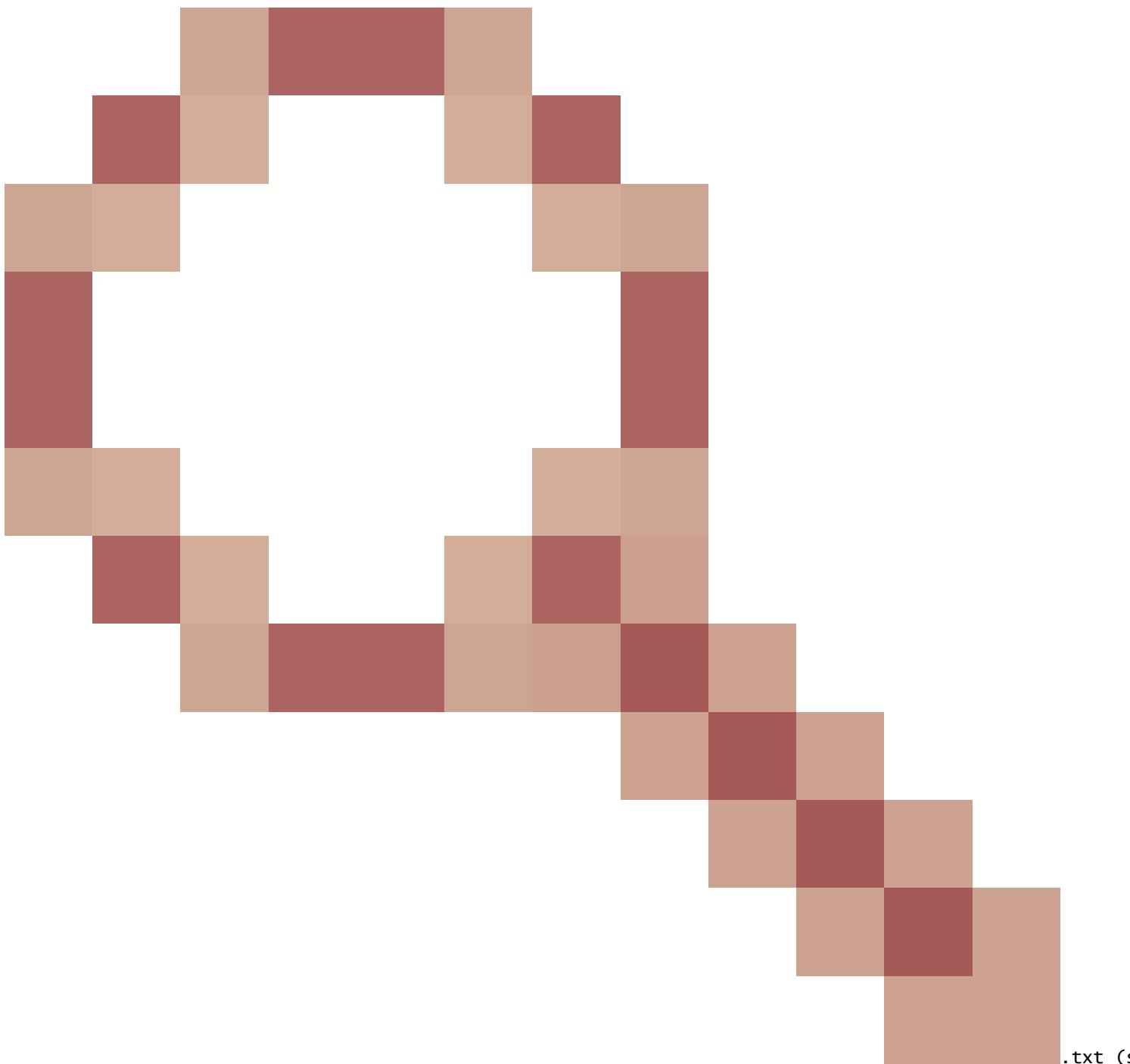
```
Info:
Warning:  Skipped adding the following package as it was already present:
Warning:      disk0:asr9k-p-4.2.1.CSCua76130-1.0.0
Warning:  Please check:
Warning:   - the set of active packages using '(admin) show install active'.
Warning:   - the set of inactive packages using '(admin) show install
              inactive'.
Info:     The following packages are now available to be activated:
Info:
Info:         disk0:asr9k-p-4.2.1.CSCtr86240-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCty18600-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCty83866-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCty84643-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCty99591-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCtz24398-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCtz62914-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCtz63248-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCtz82638-1.0.0
Info:         disk0:asr9k-p-4.2.1.CSCua04907-1.0.0
```

```
Info:          disk0:asr9k-p-4.2.1.CSCua14945-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua16764-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua25130-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua31485-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua37747-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua47910-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua48549-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua58096-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua69819-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua73510-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua74062-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua76130-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub09558-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub11591-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub16014-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub22596-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub27892-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub29765-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub41271-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub42561-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub48041-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub63396-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub68512-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub74680-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub76221-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub93663-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub96985-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub98258-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc06881-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc13193-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc47238-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc47635-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc49627-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc56676-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc62781-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc74345-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc78780-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc95853-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCud16267-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCud21216-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCud39827-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCud59391-1.0.0
Info:
Info:     The packages can be activated across the entire router.
Info:
Install operation 131 completed successfully at 01:31:11 UTC Tue May 14 2013.
```

Example Install Add Operation - FTP and tar File

To perform an install add from an FTP server, you must specify the FTP username and password.

The FTP username and password are configured with the **ftp client username** and **ftp client password** configuration commands, or they can be specified inline in the **install add** command.

```
RP/0/RSP0/CPU0:ASR9001#config
Tue May 14 21:27:50.489 UTC
RP/0/RSP0/CPU0:ASR9001(config)#ftp client username ftpuser
```

```
RP/0/RSP0/CPU0:ASR9001(config)#ftp client password ftppassword
RP/0/RSP0/CPU0:ASR9001(config)#commit
RP/0/RSP0/CPU0:ASR9001(config)#
```

Example Install Add Operation - Source Option

Use the source keyword option in order to specify the source location of the SMU. Because you can add
multiple SMUs in one operation if you string together a list of SMUs with spaces between, use of the source
keyword eliminates the need to specify the location of each SMU when you add a long list.

```
 RP/0/RSP0/CPU0:ASR9001(admin)#install add source
    tftp://10.0.0.1 4.2.1_asr9k-p_REC_SMUS_2013-03-23.tar
Tue May 14 04:27:50.708 UTC
Install operation 134 '(admin) install add source
    /tftp://10.0.0.1/4.2.1_asr9k-p_REC_SMUS_2013-03-23.tar' started by user
'root' via CLI at 04:27:51 UTC Tue May 14 2013.
Warning:  The following file has the suffix '.tar' and will be treated as a
    tar file:
Warning:       /tftp://10.0.0.1/4.2.1_asr9k-p_REC_SMUS_2013-03-23.tar
Warning:  If a file should not be treated as tar file:
Warning:   - change the file extension.
Warning:  To stop this message being displayed:
Warning:   - use the tar keyword to explicitly specify a tar file.
```

Example Install Add Operation - Custom Tarball from Recommended SMU Bundle

You can create and add a custom tarball file of individual SMUs. Copy all the SMU PIE files to add into a
directory on the server, then use the **tar -cvf** command in order to create a custom SMU tarball of the SMUs
to be added and activated.

In this example, a wildcard is used in order to add all the SMUs in the directory to the tarball. Alternatively,
each SMU could have been specified individually in the command line.

<#root>

```
server:/tftpboot/4.2.3/custom$ ls
asr9k-p-4.2.3.CSCub22596
```
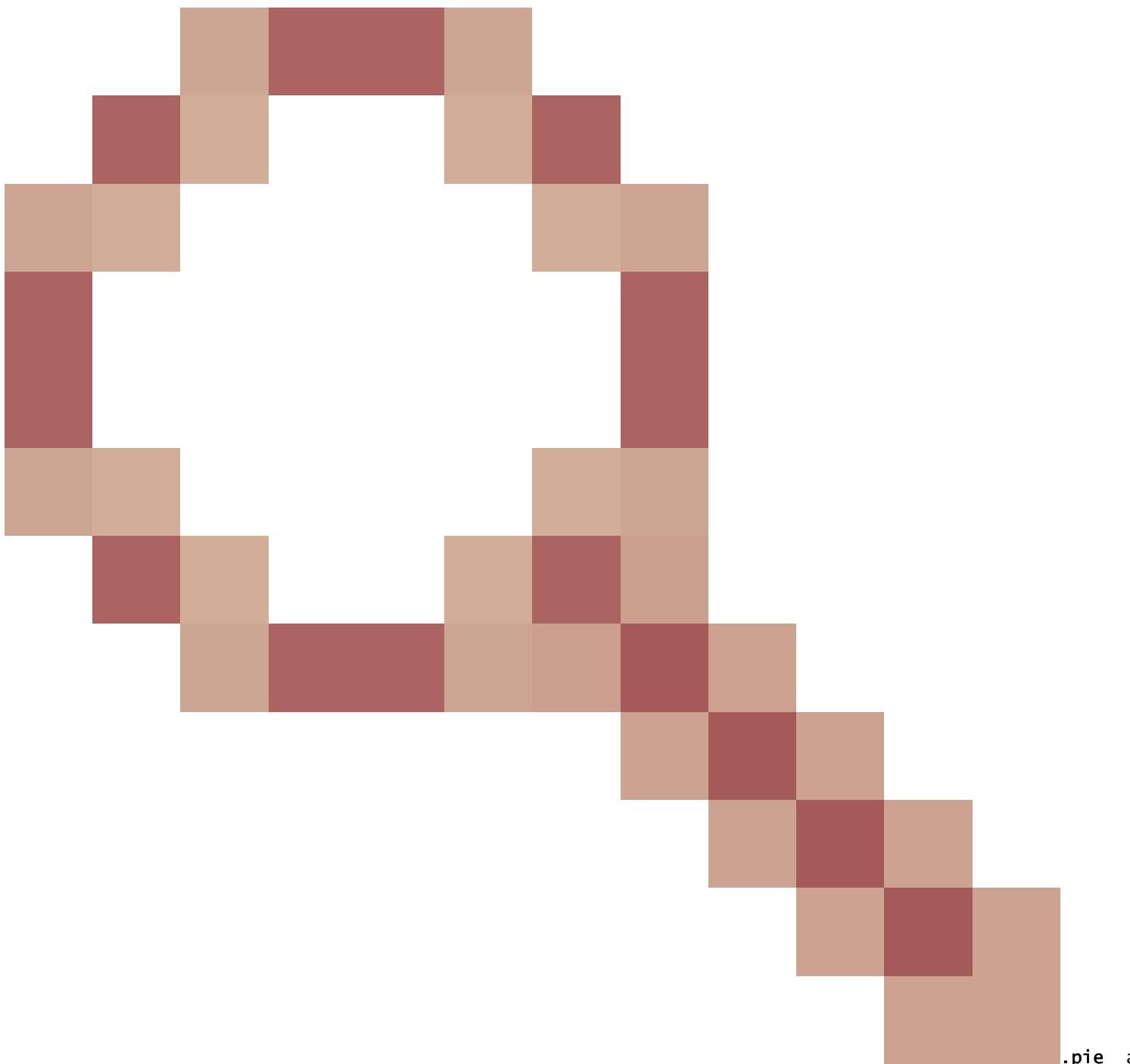
.pie a

asr9k-p-4.2.3.CSCud19188

.pie a
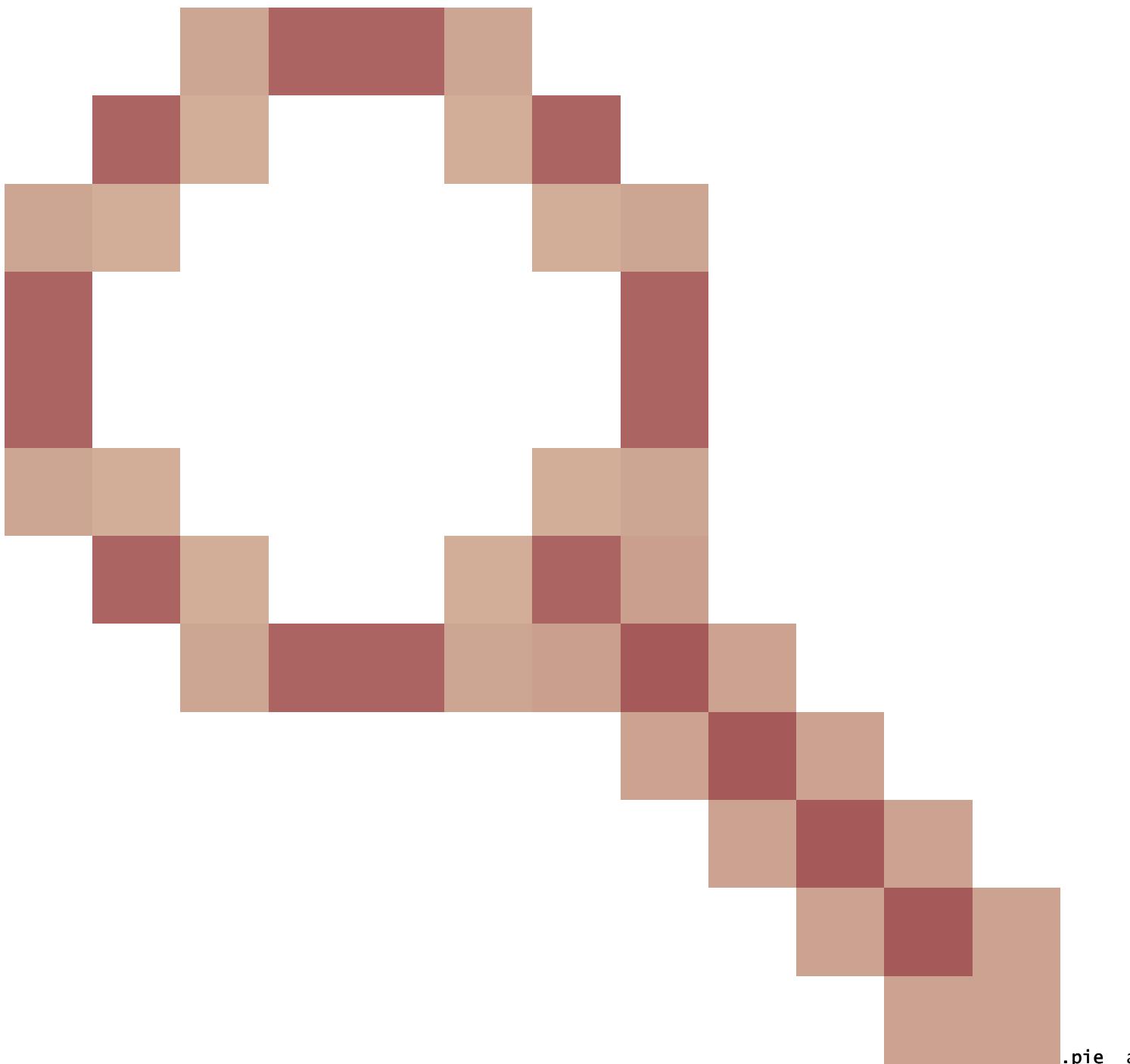
asr9k-p-4.2.3.CSCud98419

.pie a
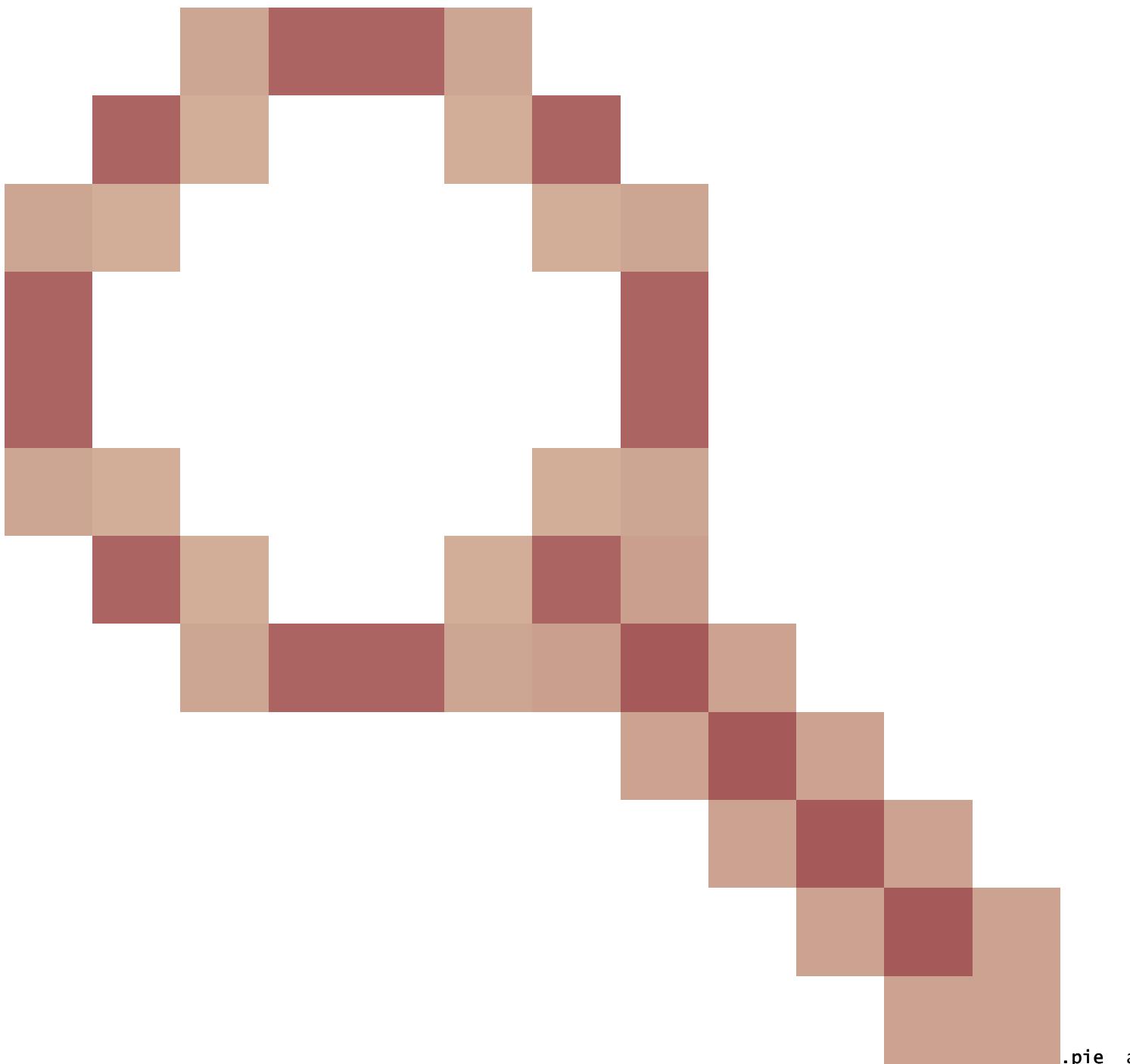
asr9k-p-4.2.3.[CSCuc84257](#)

.pie a
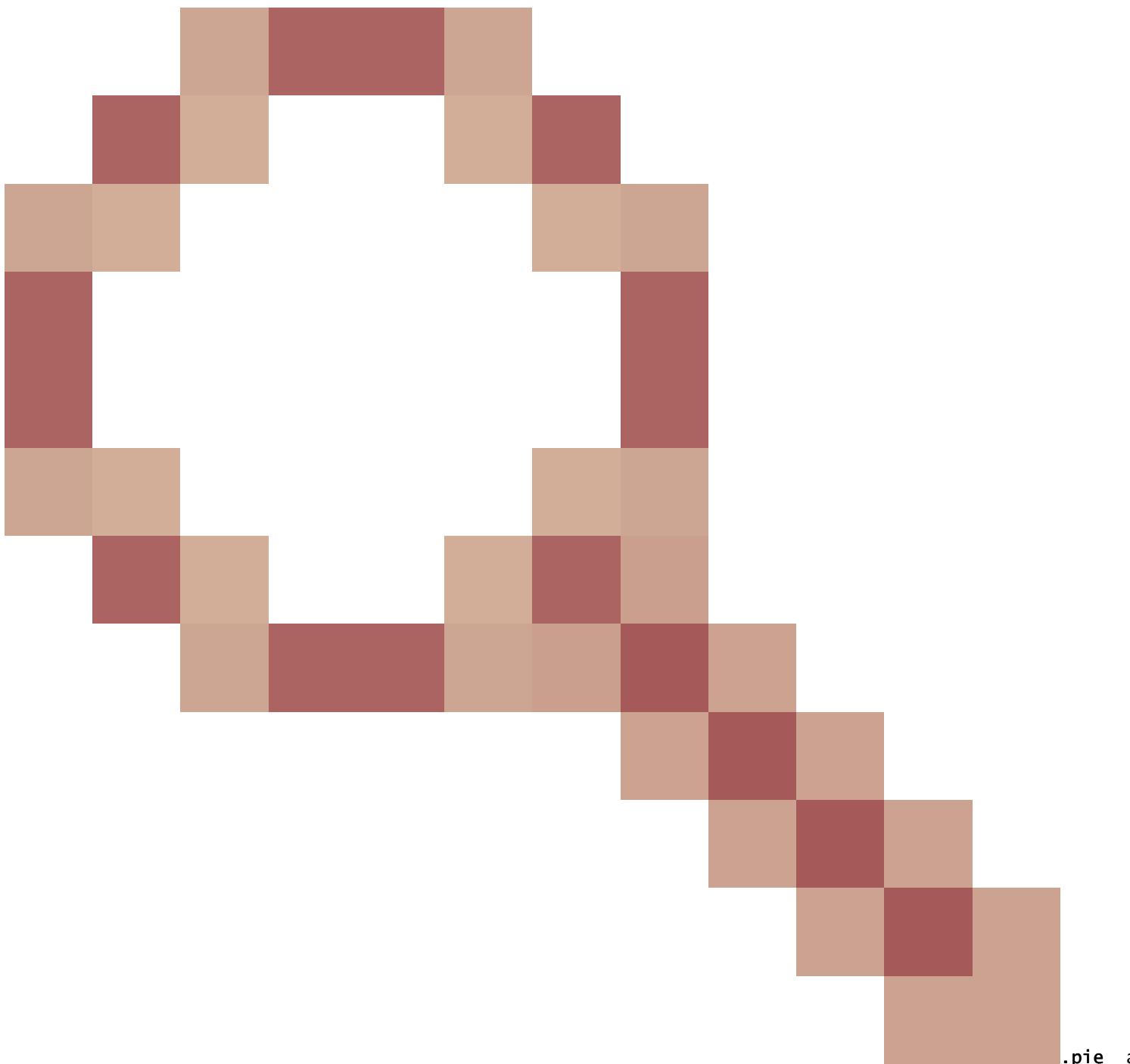
asr9k-p-4.2.3.CSCud54093
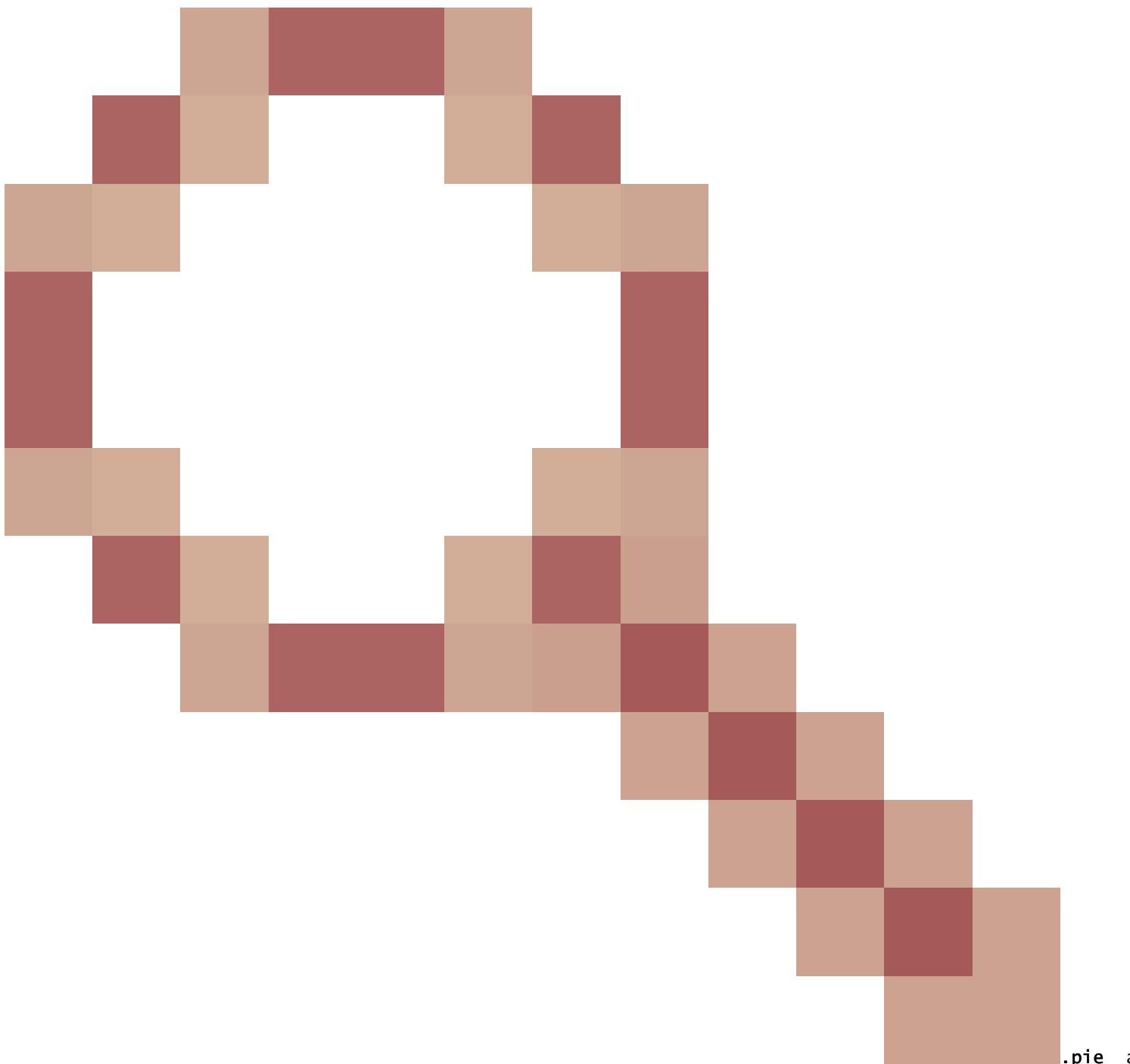
.pie a
asr9k-p-4.2.3.CSCub74517

.pie a
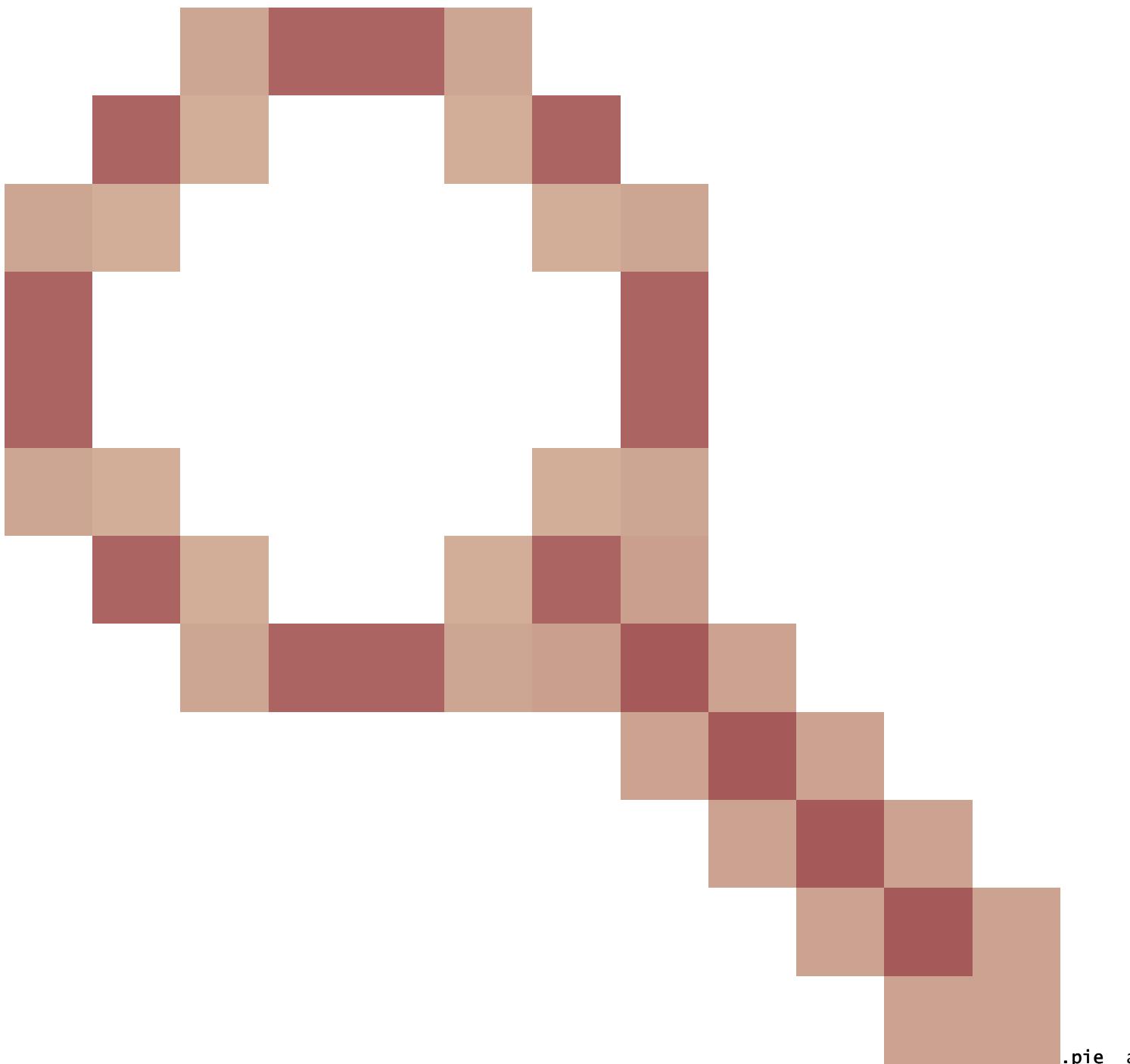
asr9k-p-4.2.3.[CSCud37351](#)

.pie a
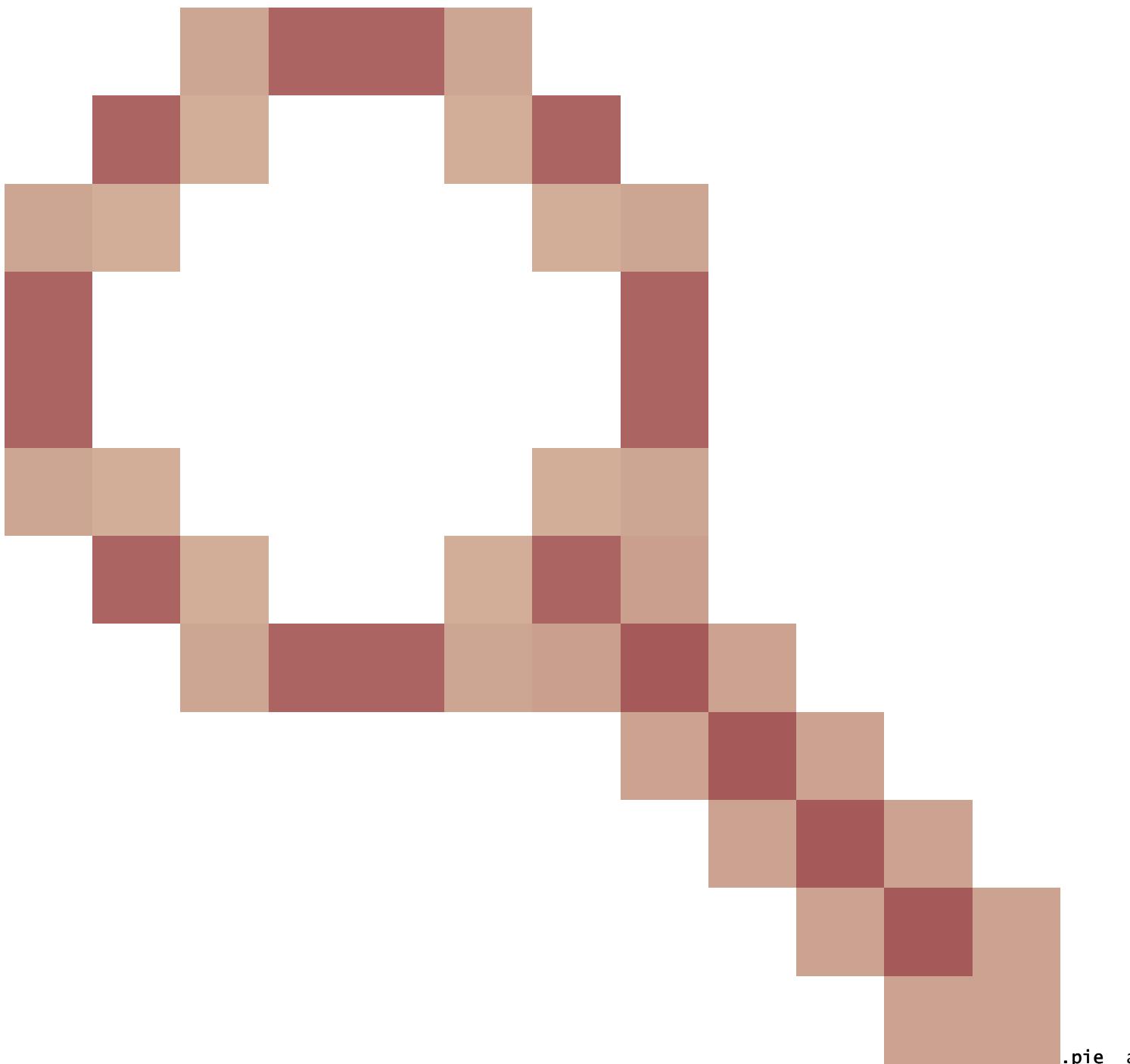
asr9k-p-4.2.3.[CSCub96985](#)

.pie a
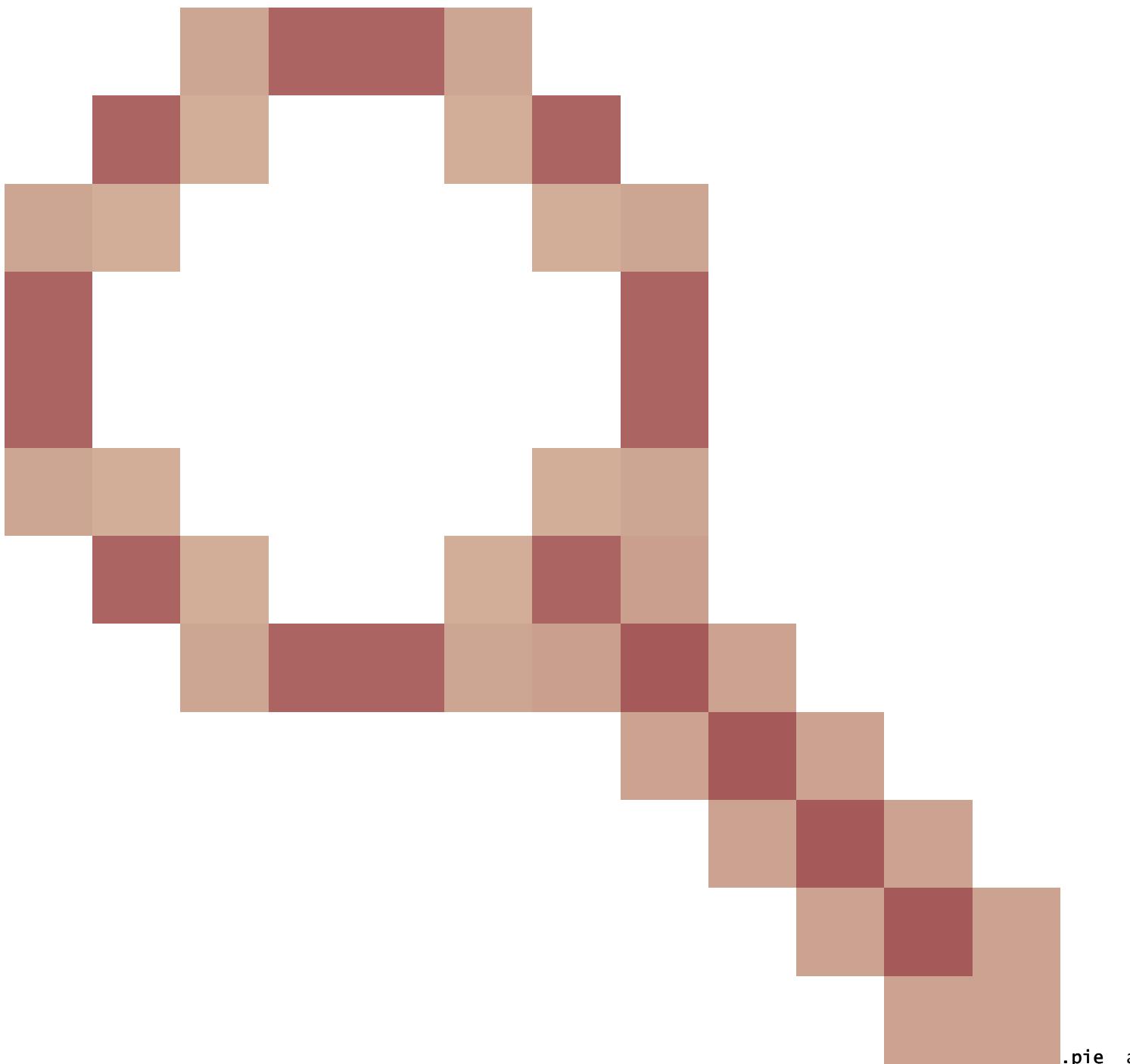
asr9k-p-4.2.3.CSCud39254

.pie a
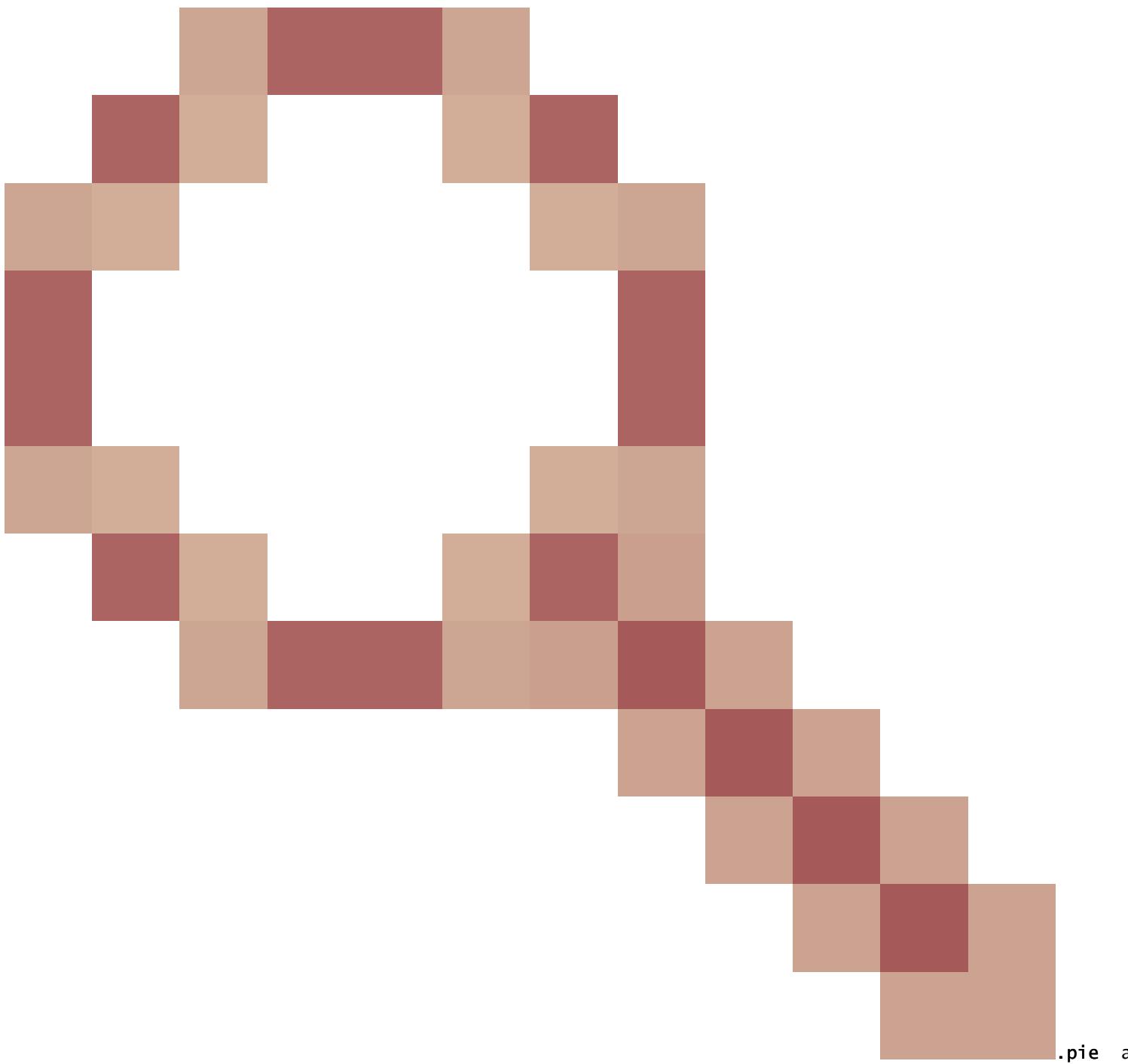
server:/tftpboot/4.2.3/custom$ tar -cvf custom-tarball /tftpboot/4.2.3/custom/*

tar: Removing leading `/' from member names
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.CSCub22596
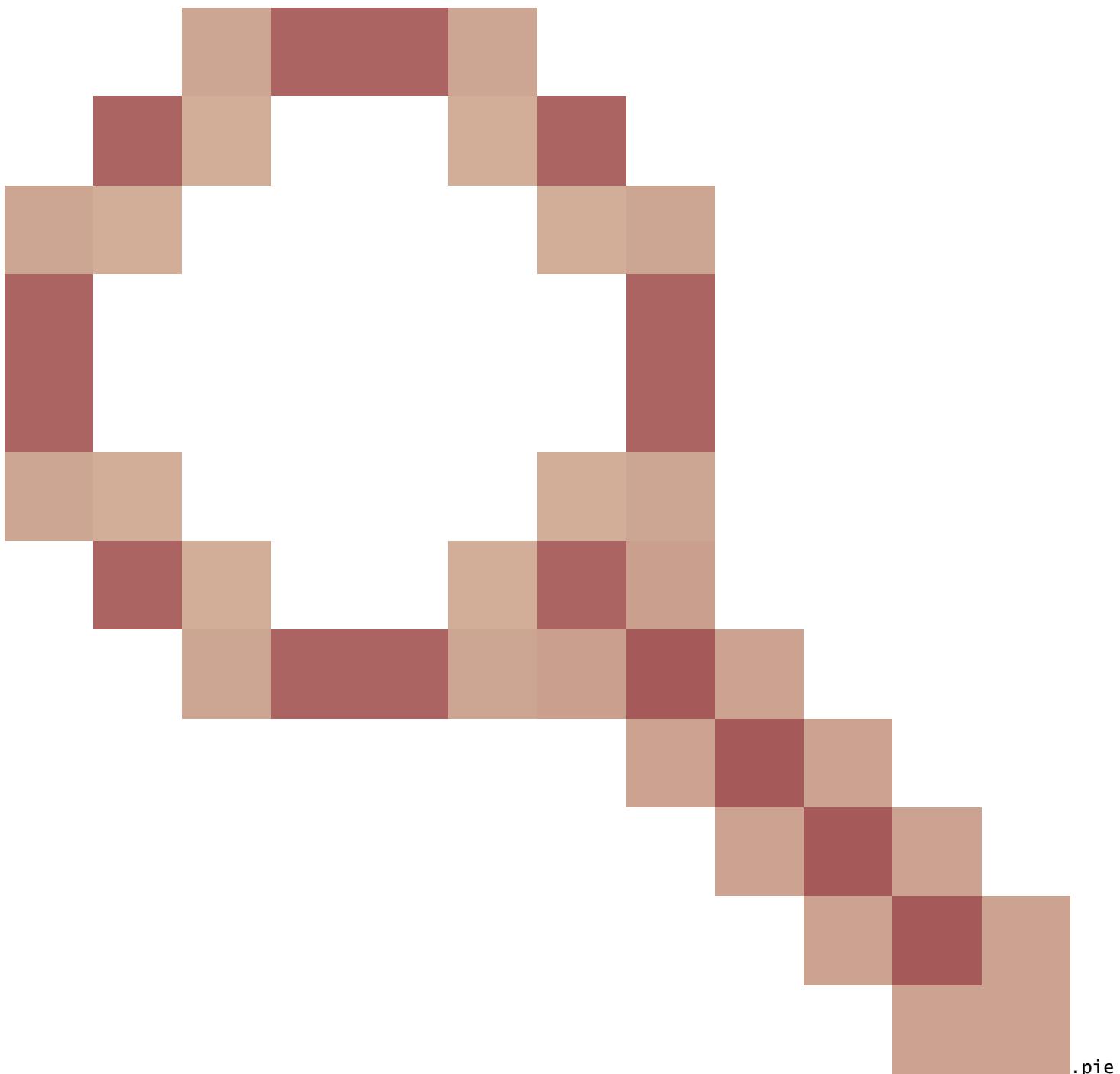
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCub30046](#).pie
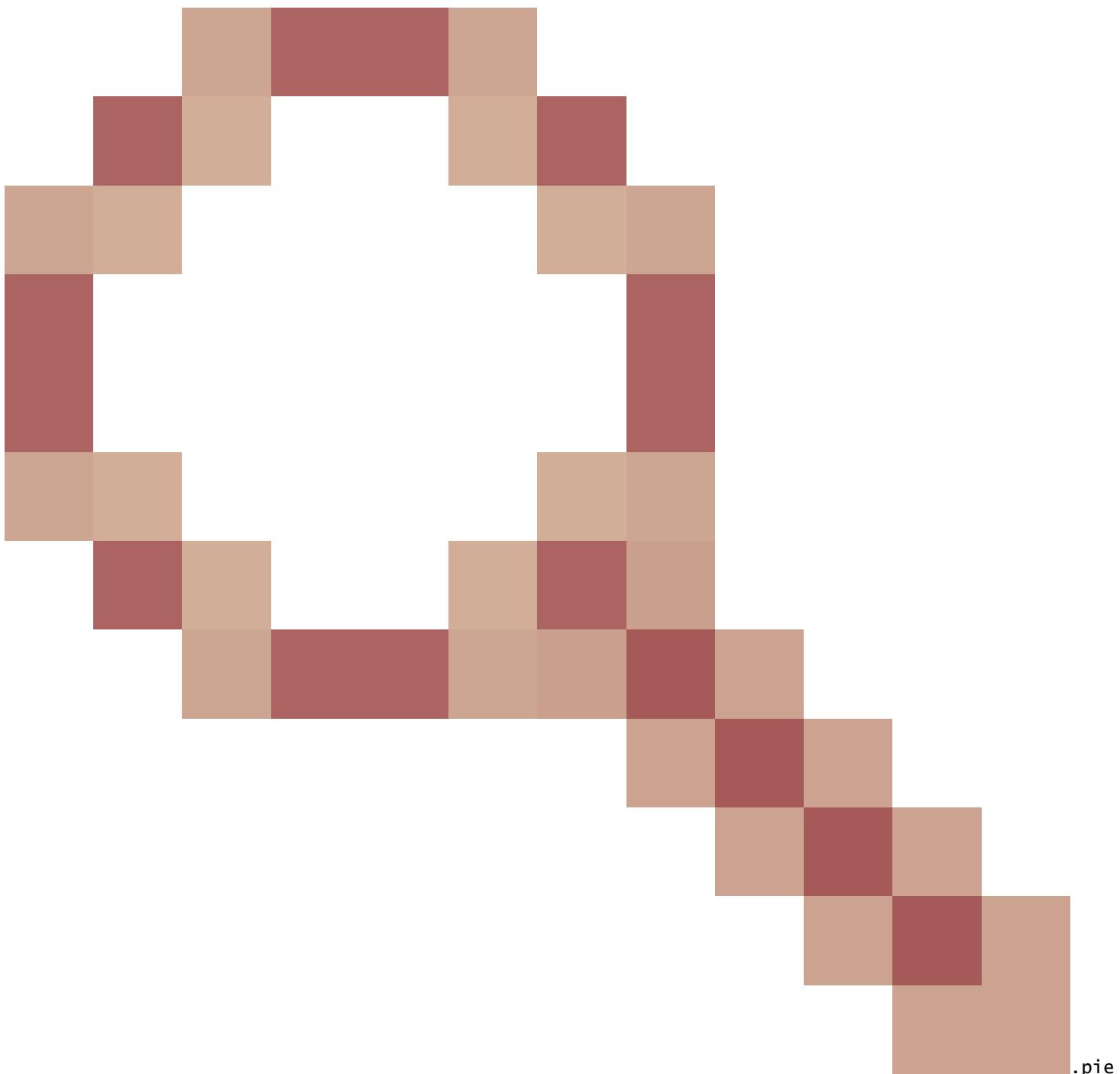
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCub74517](#).pie
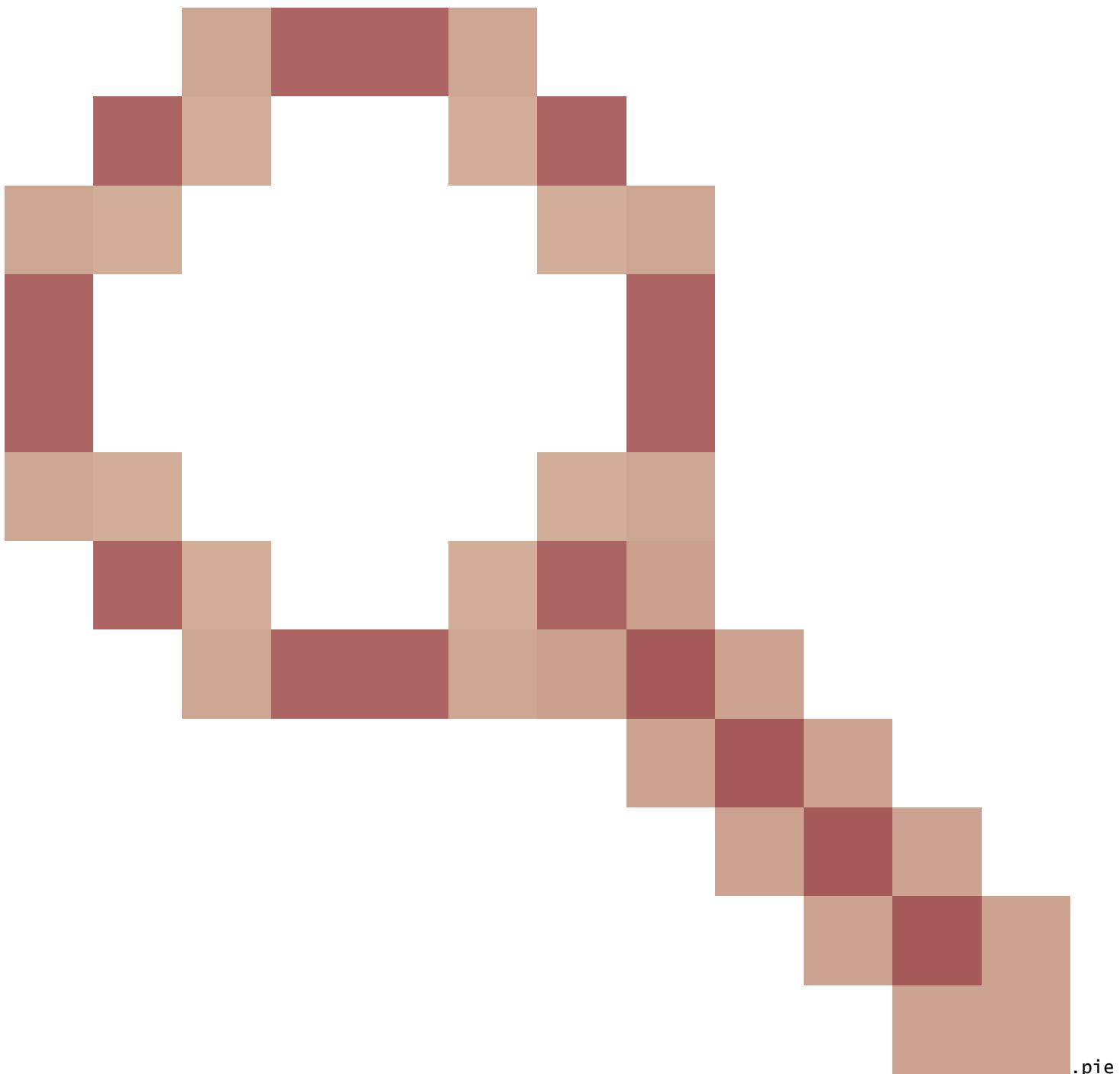
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCub96985](#).pie
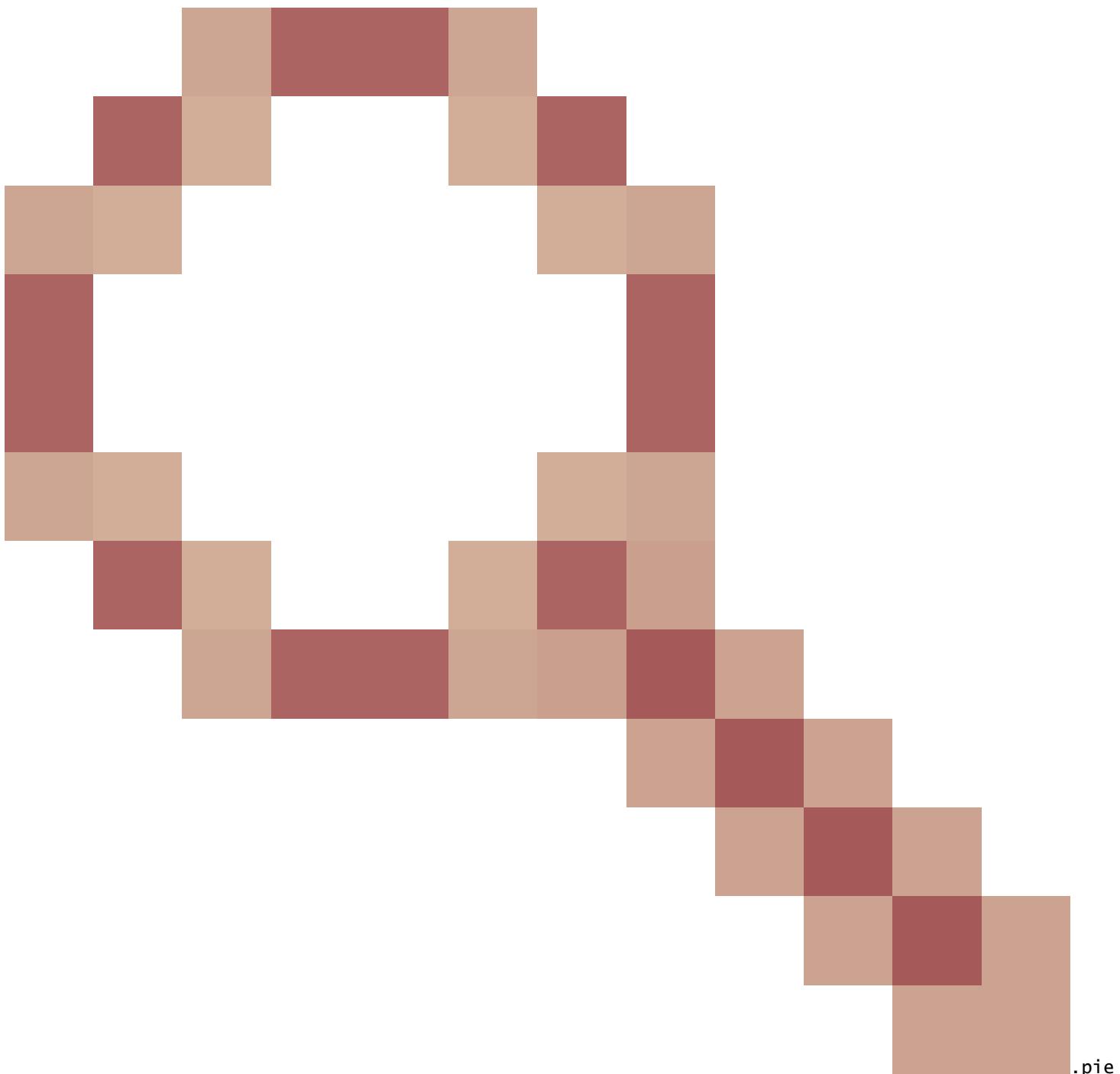
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCuc59492](#).pie
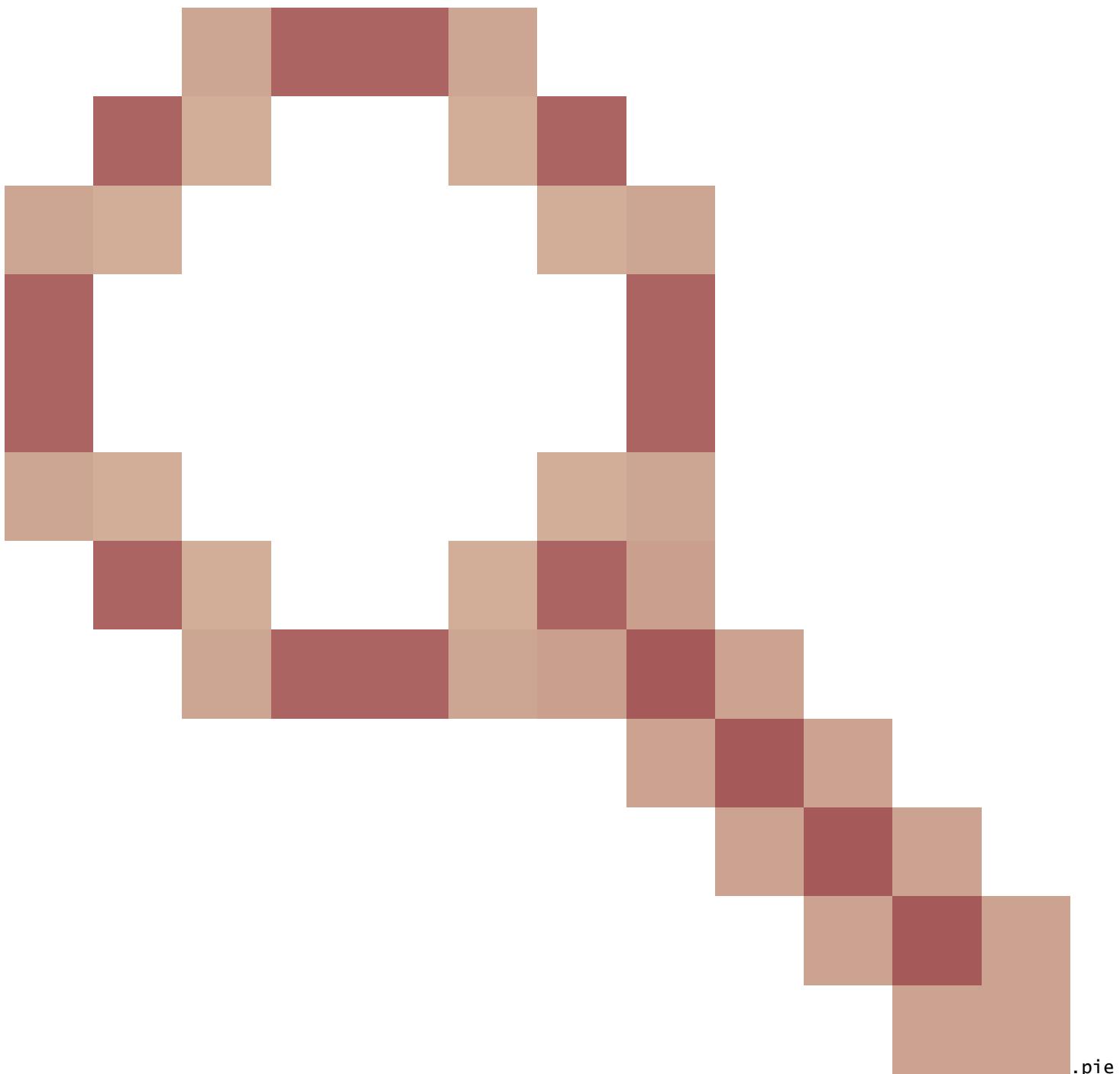
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCuc84257](#).pie
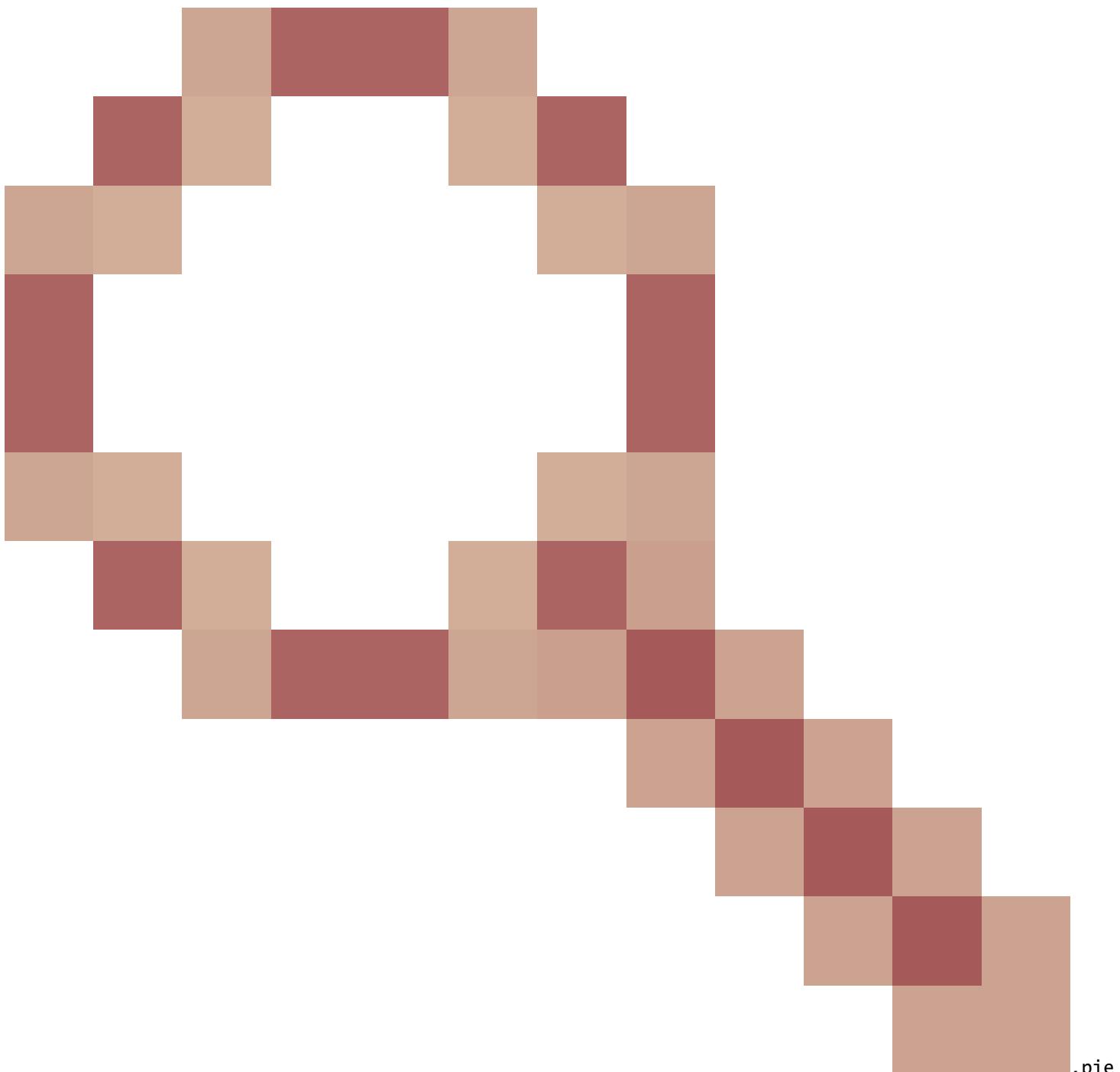
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.CSCud07536.pie
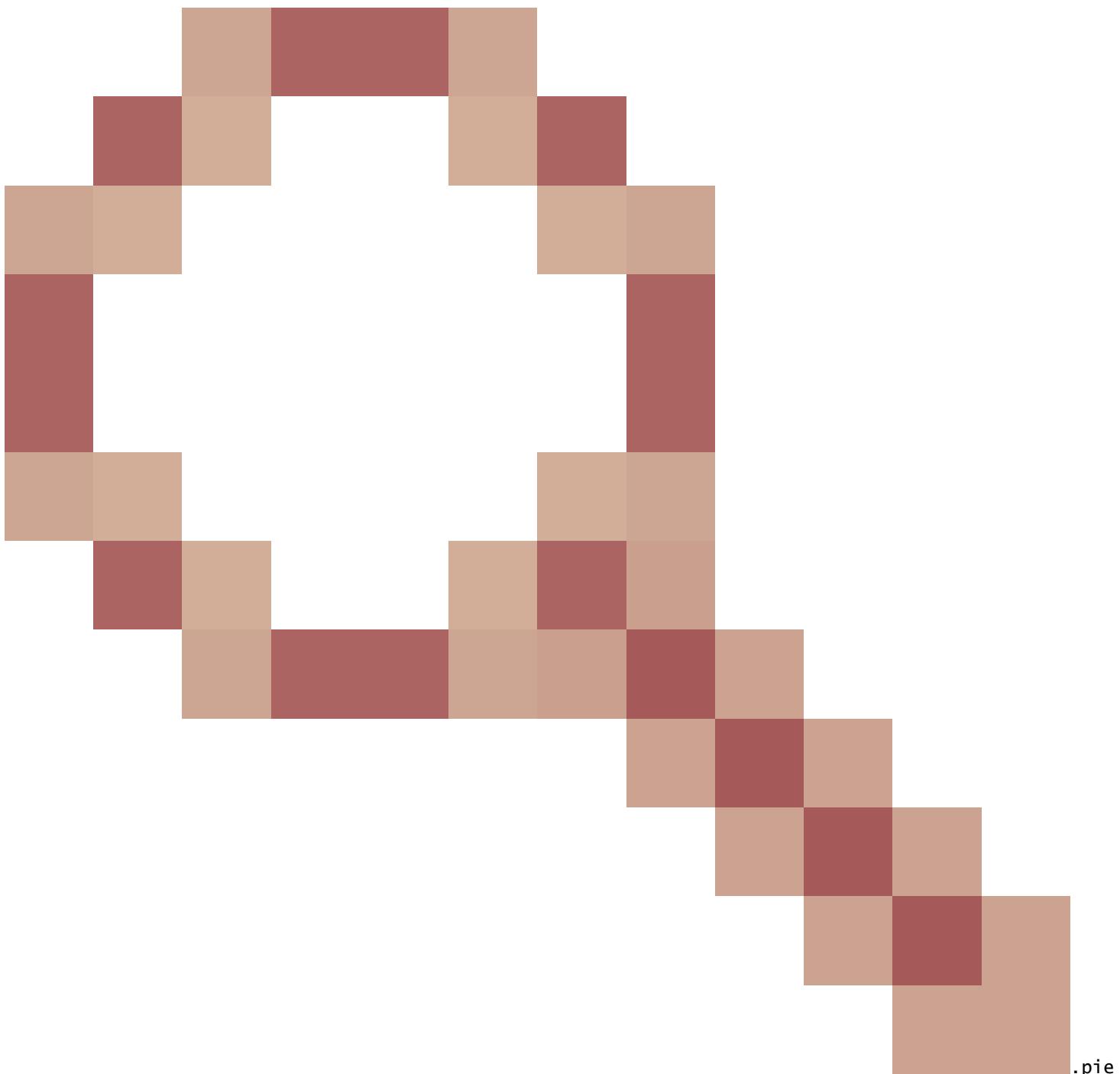
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.CSCud08809.pie
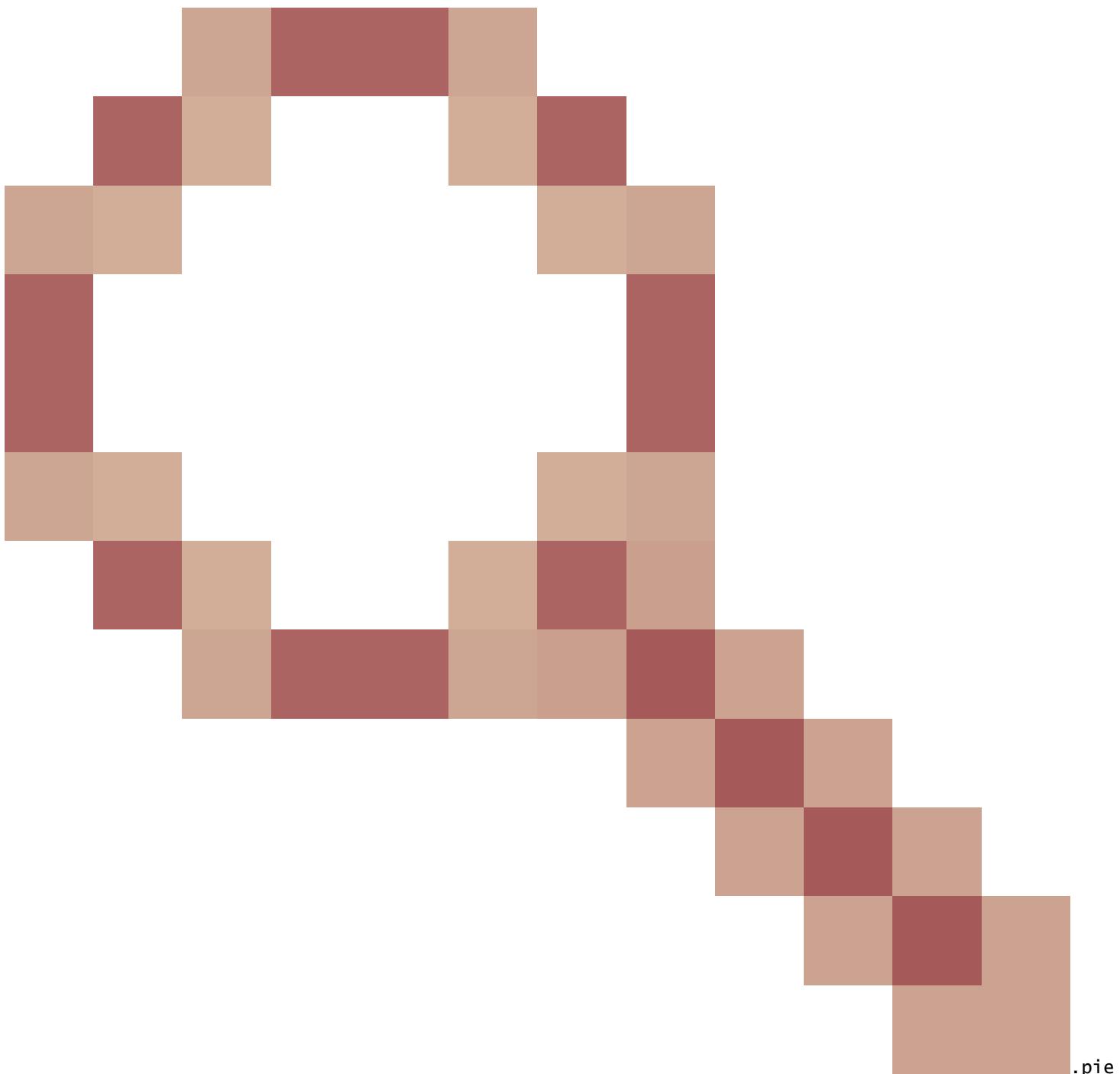
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.CSCud19188.pie
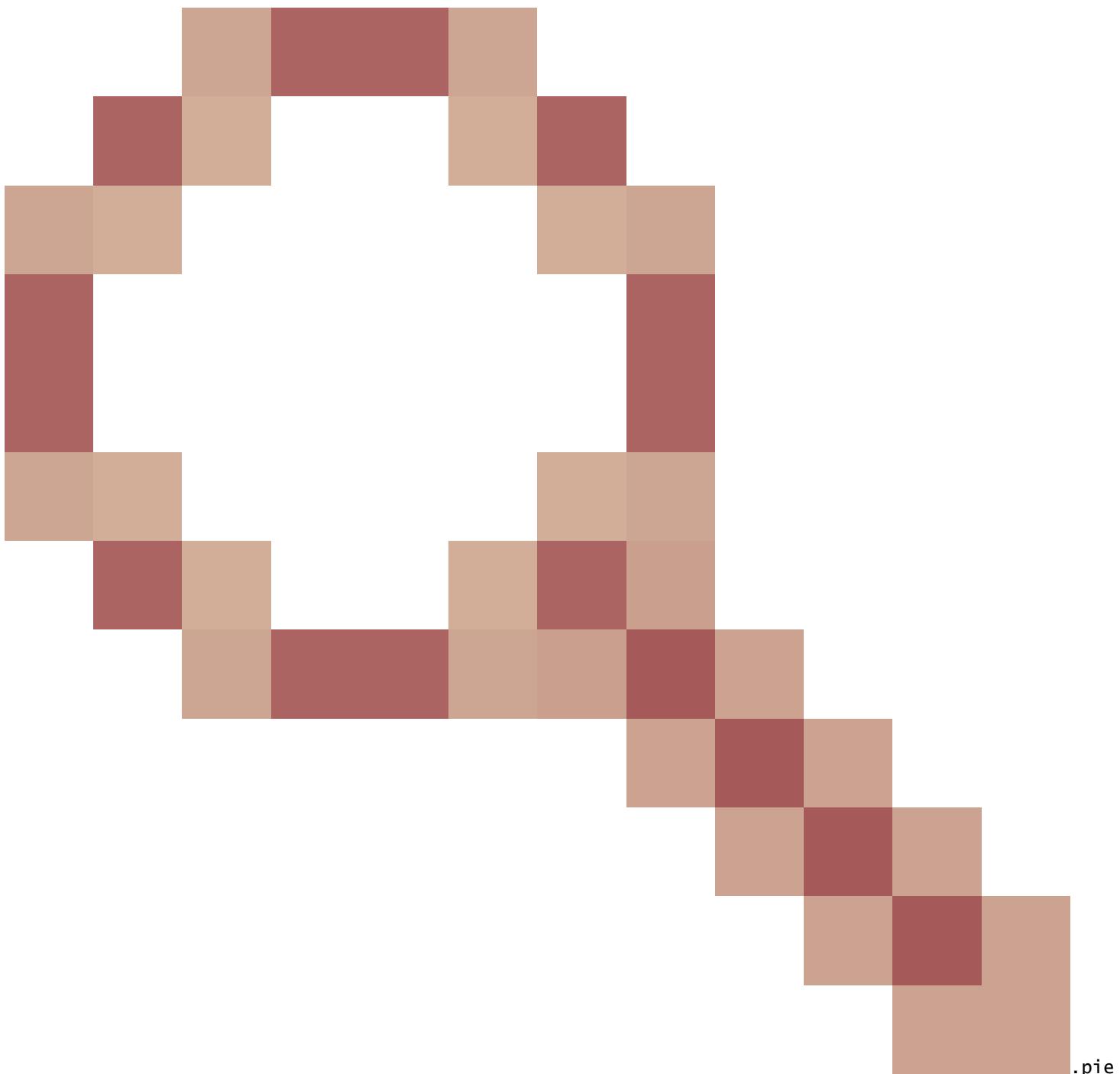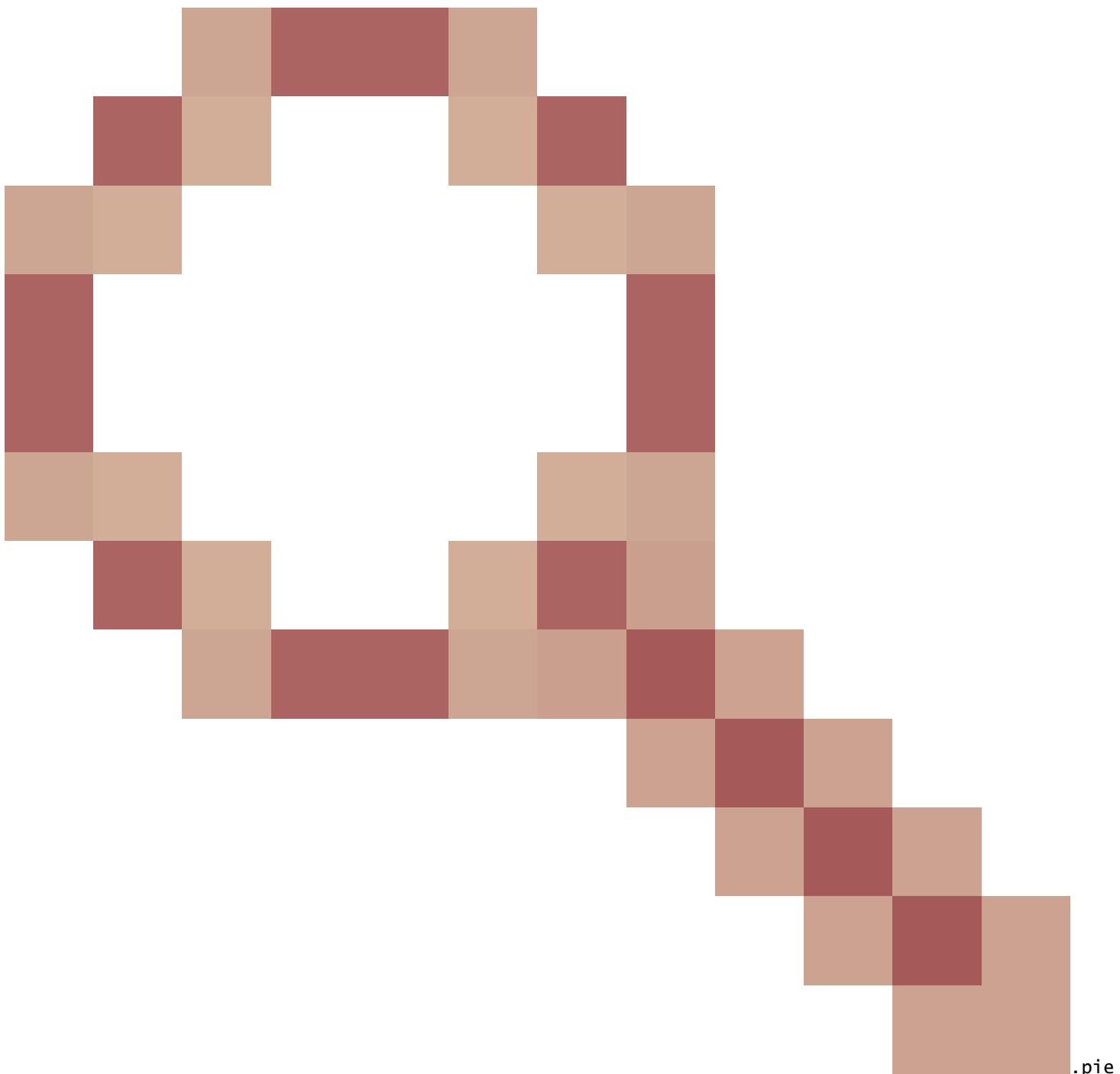
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud29892](#).pie

/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud37351](#).pie
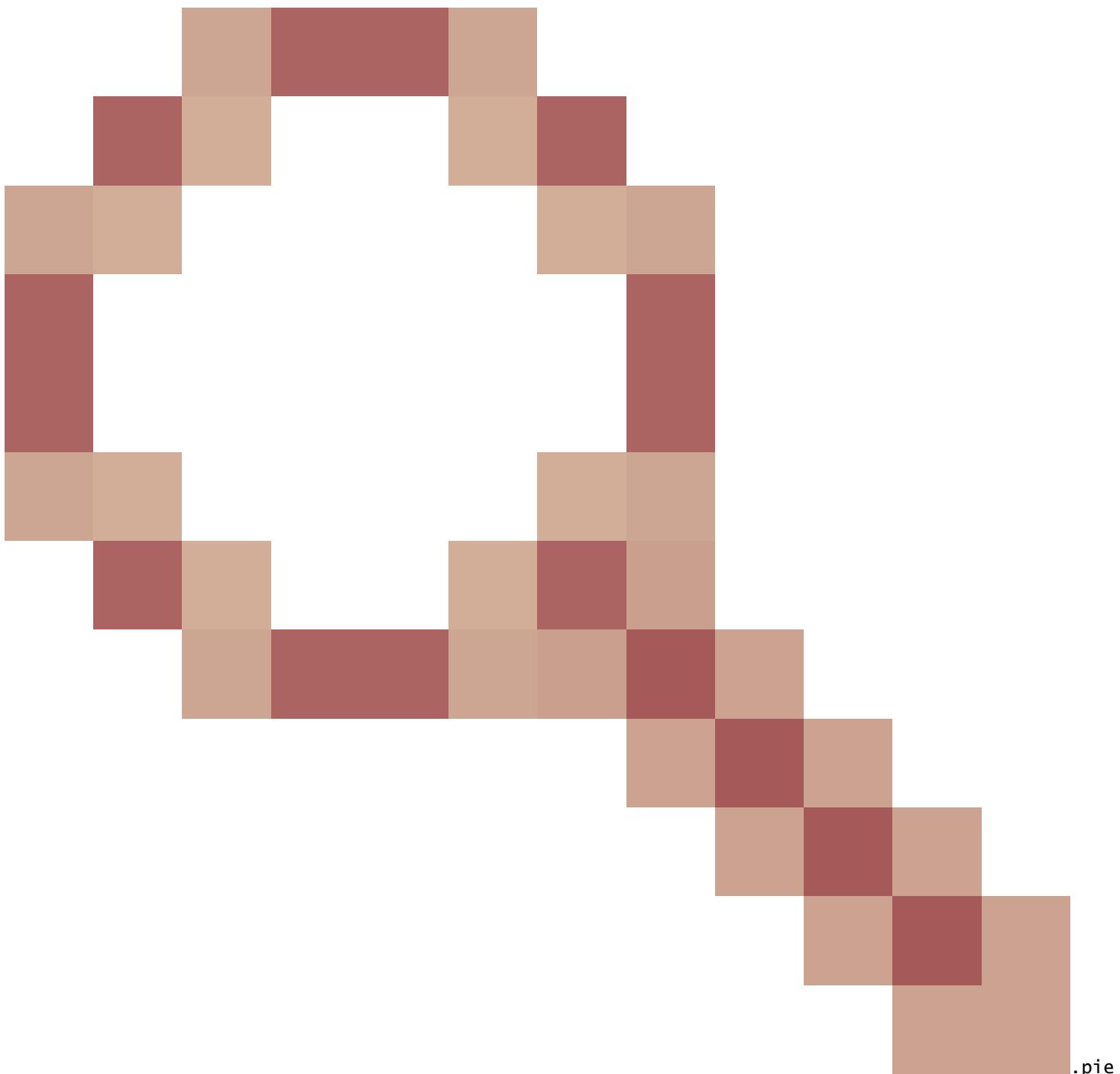
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud39254](#).pie
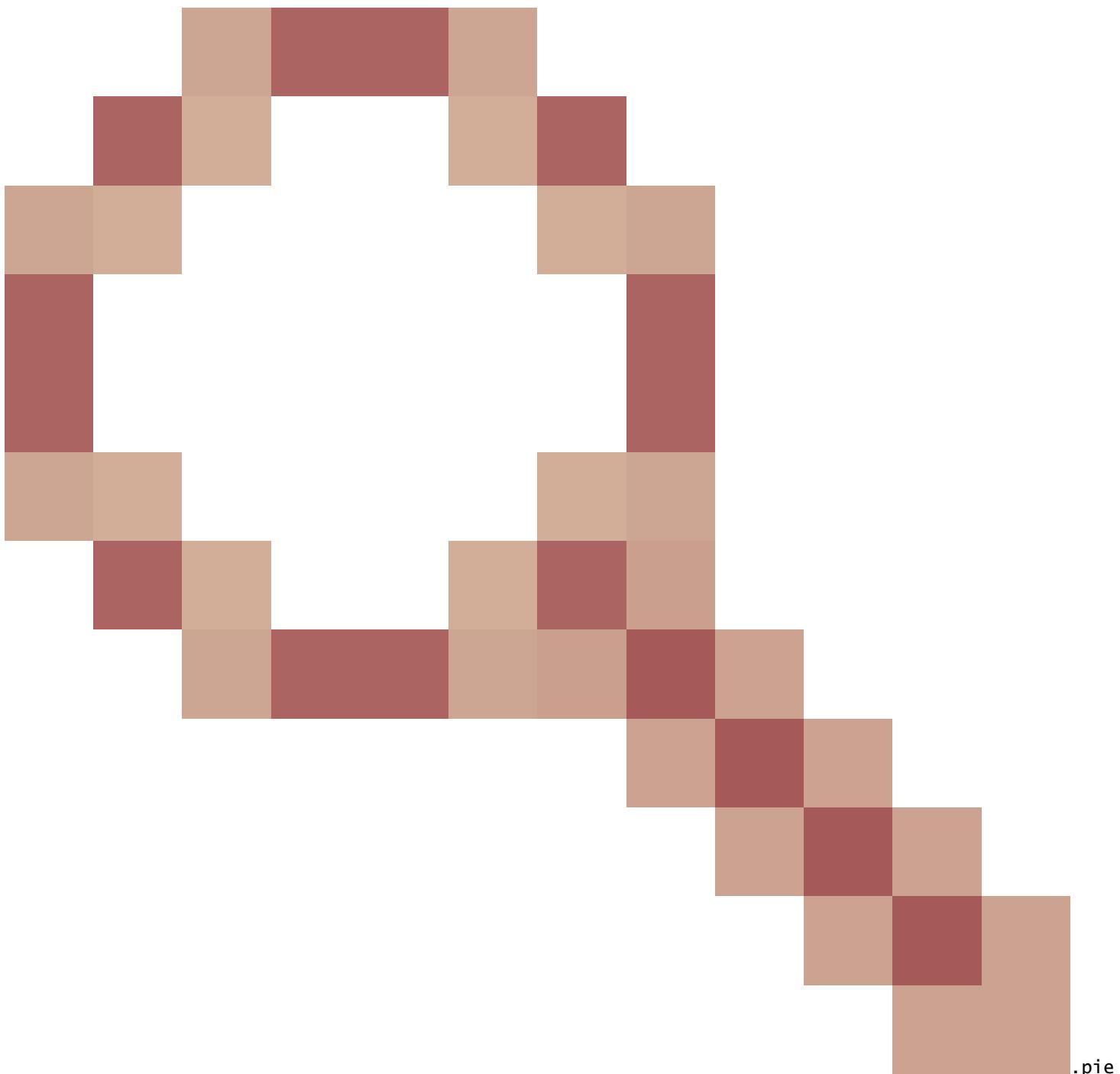
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud41972](#).pie
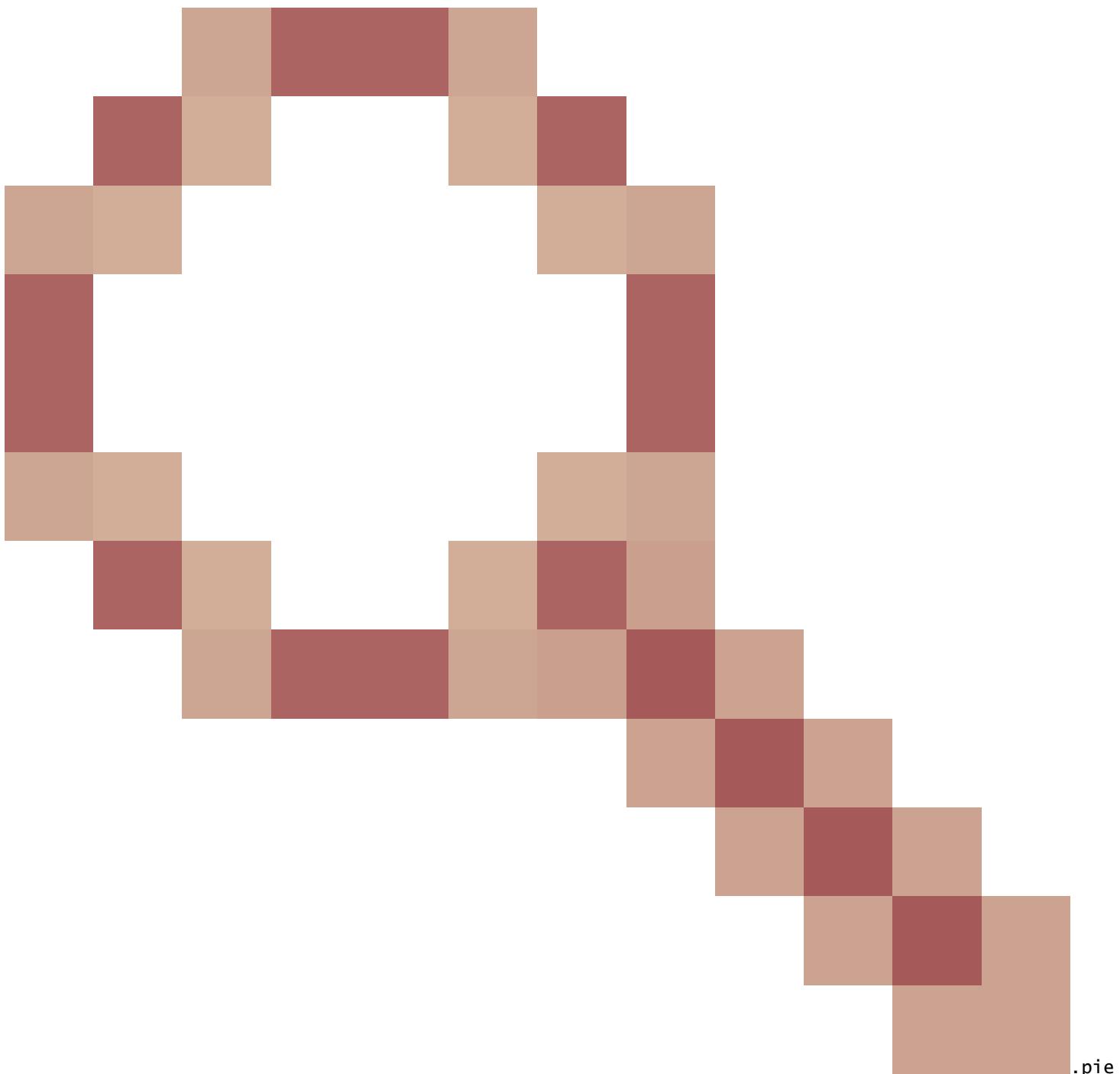
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud54093](#).pie
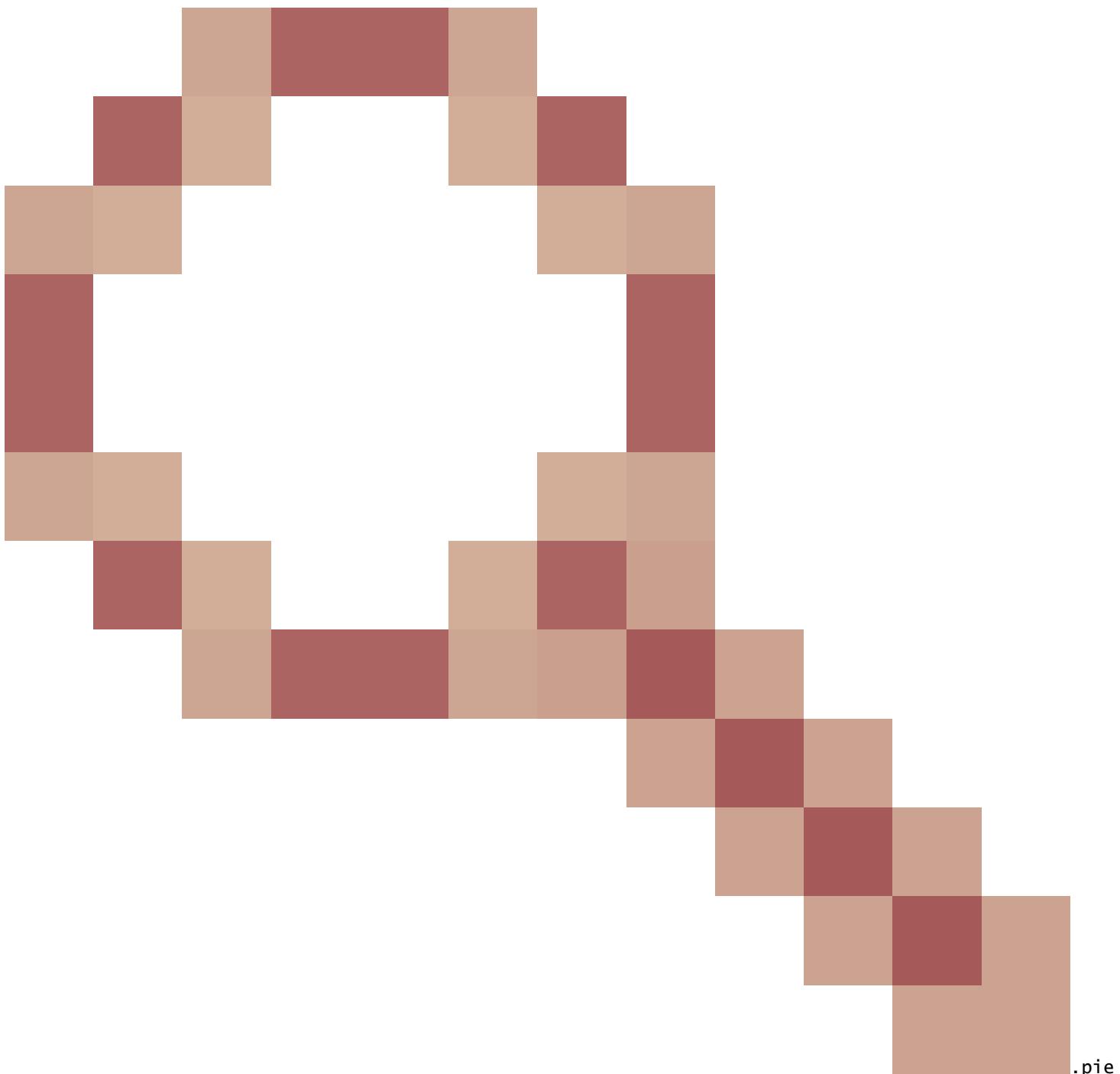
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud81064](#).pie
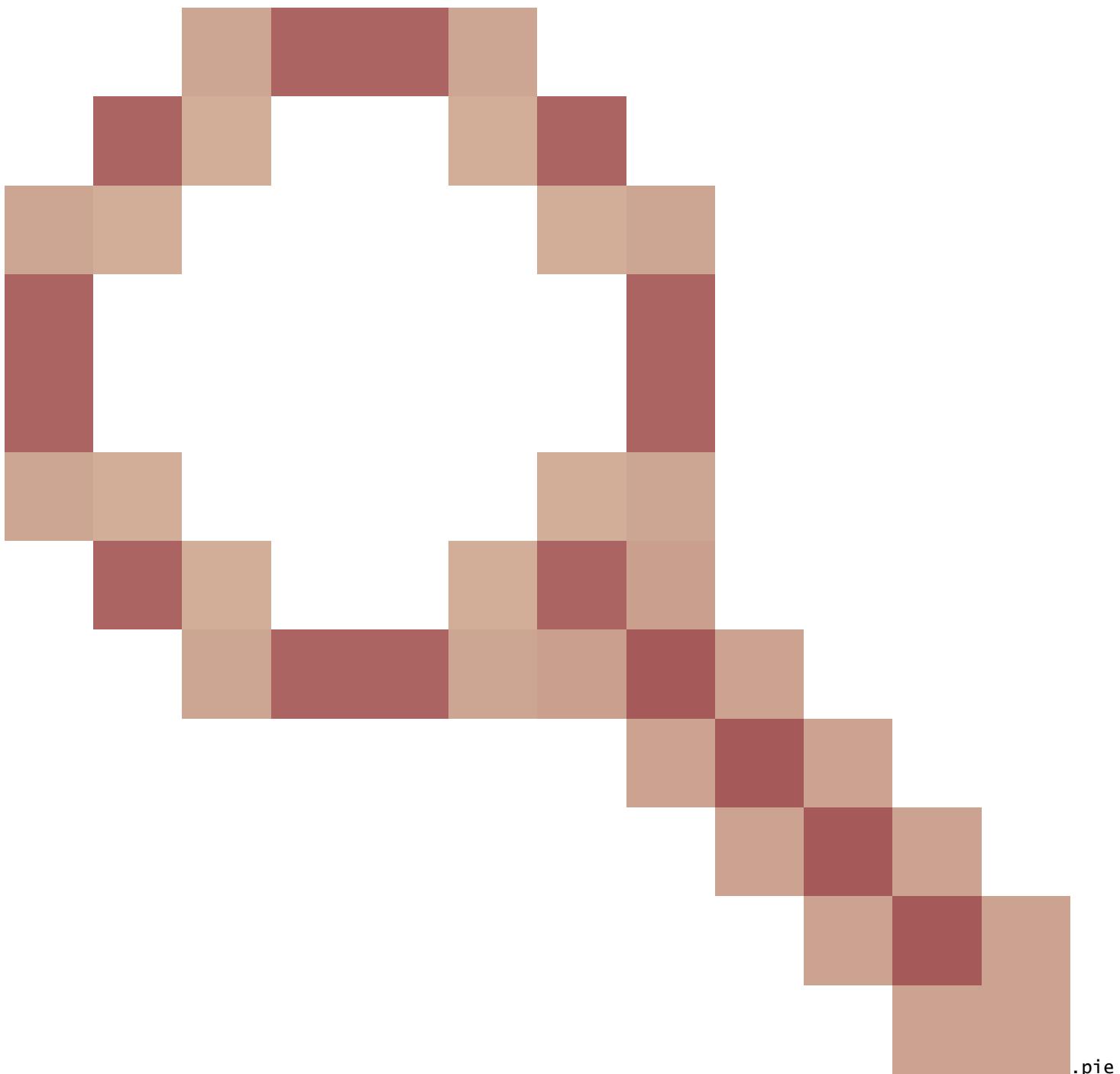
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud91167](#).pie
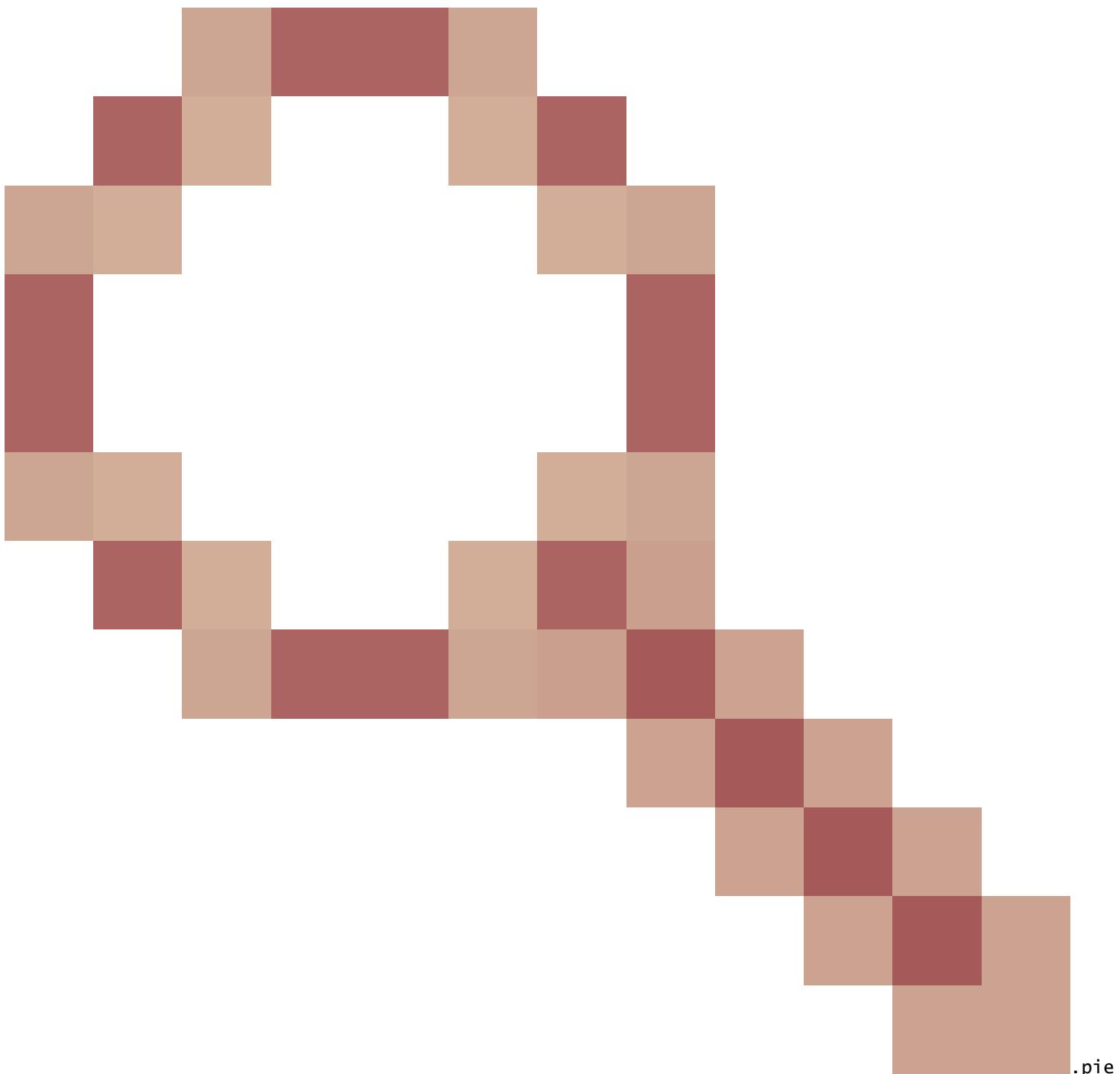
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCud98419](#).pie
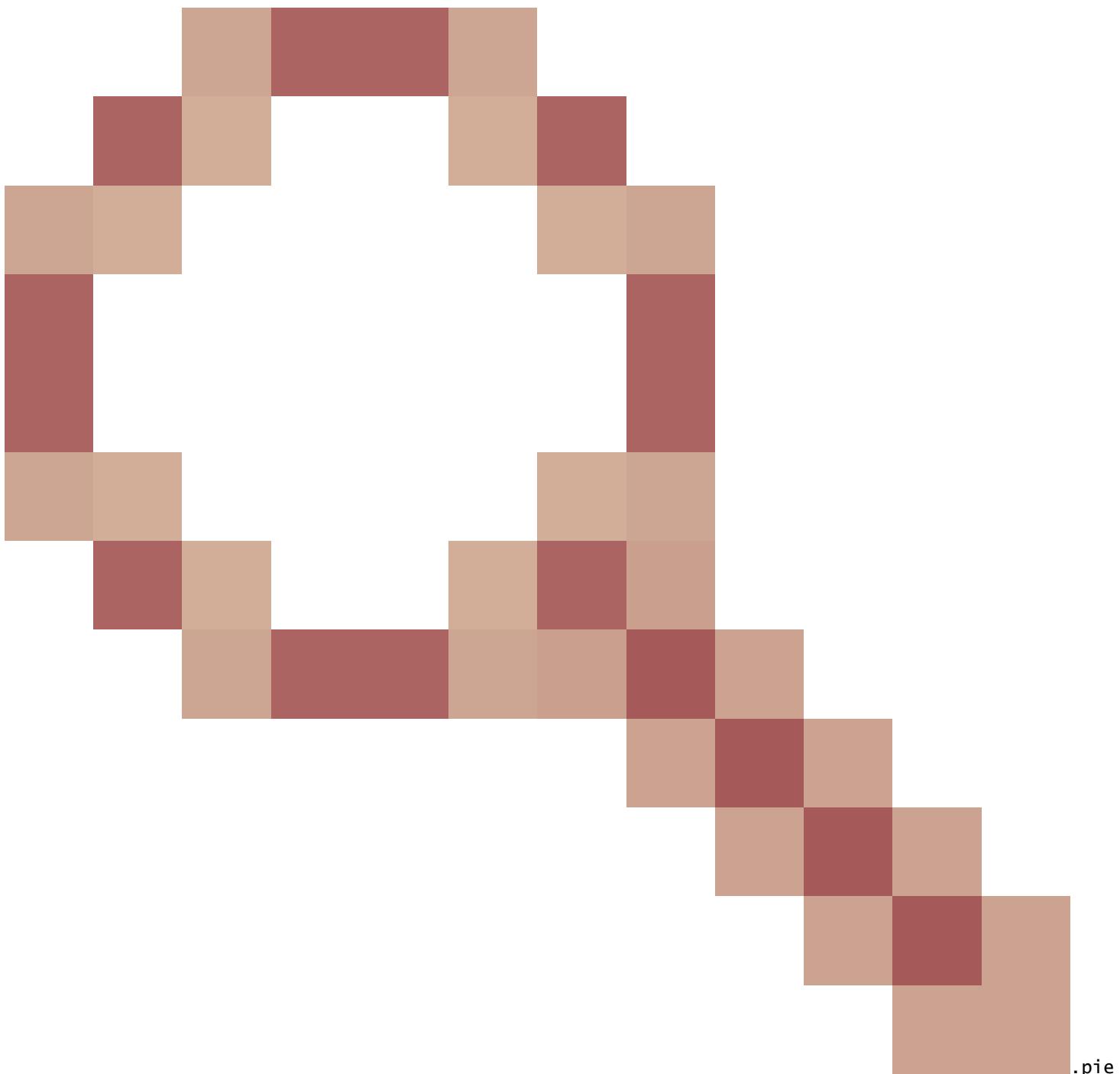
/tftpboot/4.2.3/custom/asr9k-p-4.2.3.[CSCue21593](#).pie

.pie
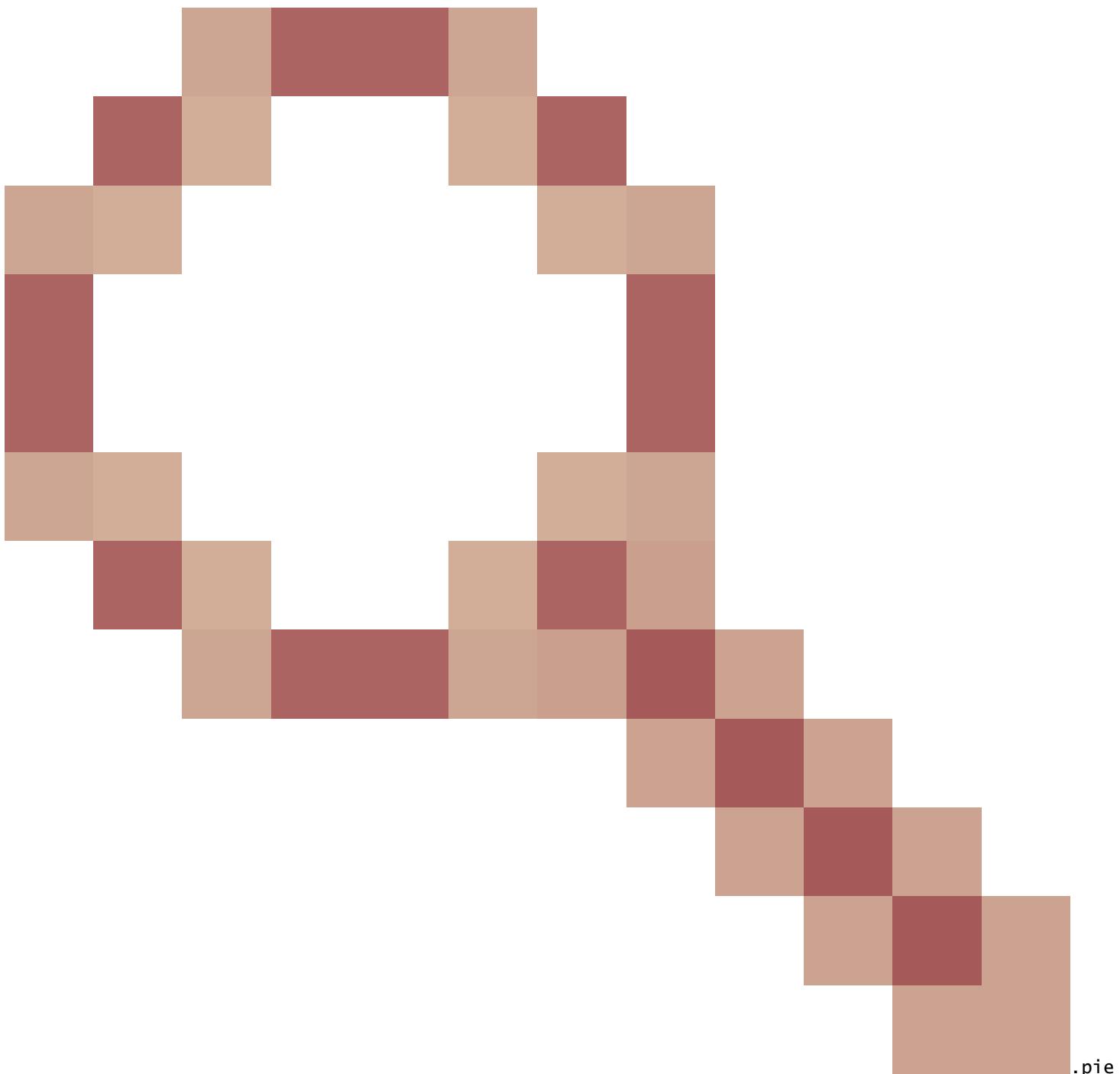
```
server:/tftpboot/4.2.3/custom$ ls -al
total 313292
drwxr-xr-x 2 lab ftp-users      4096 May 14 17:36 .
drwxr-xr-x 3 lab ftp-users      4096 May 14 16:54 ..
```


.pie

```
-rw-r--r-- 1 lab ftp-users    258888 May 14 17:00 asr9k-p-4.2.3.CSCub22596
-rw-r--r-- 1 lab ftp-users    483524 May 14 16:57 asr9k-p-4.2.3.CSCub30046
```

.pie

.pie
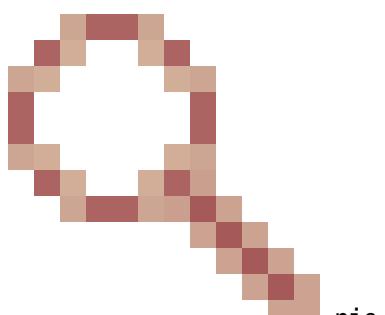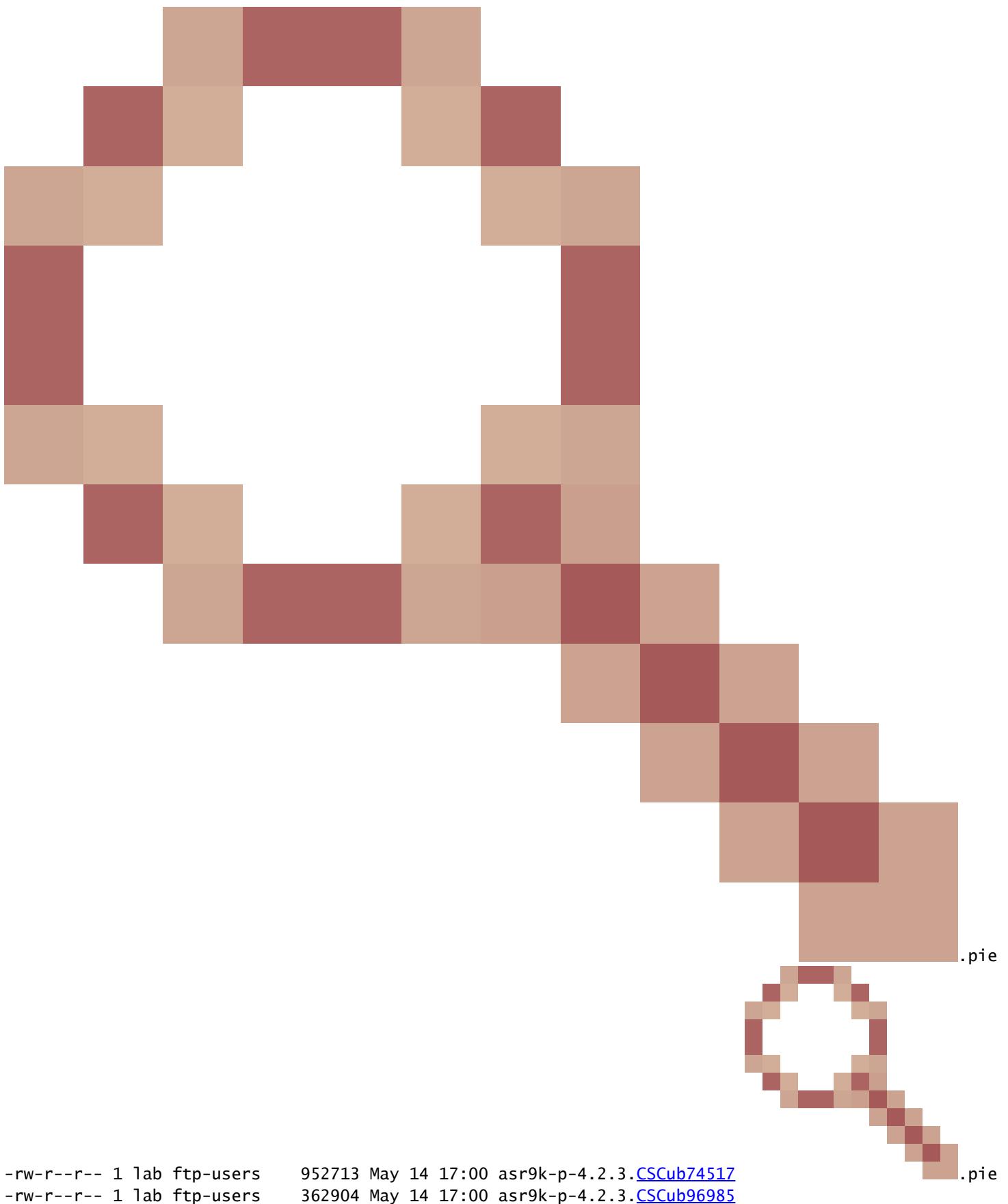
-rw-r--r-- 1 lab ftp-users   952713 May 14 17:00 asr9k-p-4.2.3.CSCub74517
-rw-r--r-- 1 lab ftp-users   362904 May 14 17:00 asr9k-p-4.2.3.CSCub96985

```
-rw-r--r-- 1 lab ftp-users   2483518 May 14 17:00 asr9k-p-4.2.3.CSCuc59492.pie
-rw-r--r-- 1 lab ftp-users  45890057 May 14 17:00 asr9k-p-4.2.3.CSCuc84257.pie
```

.pie

.pie
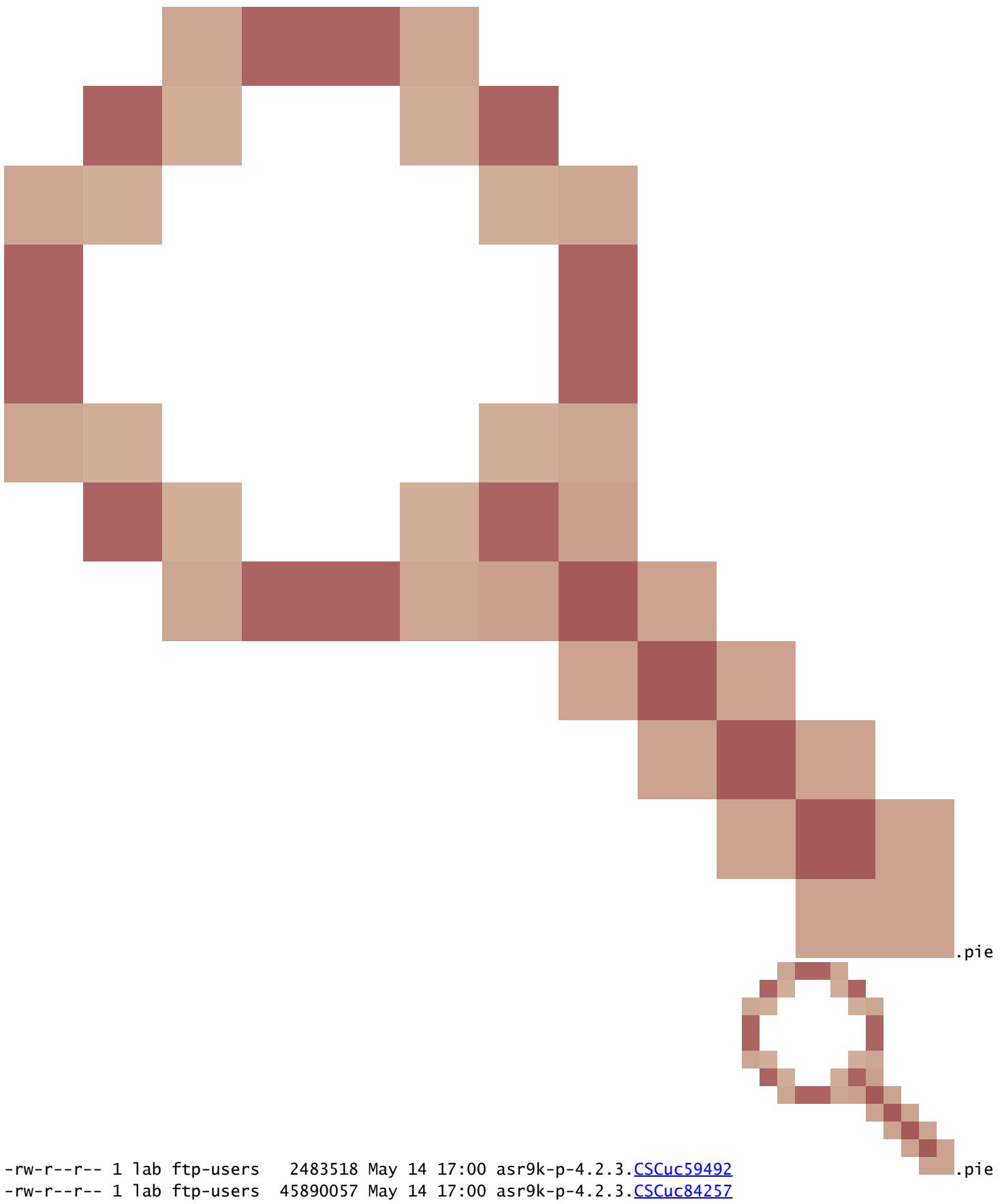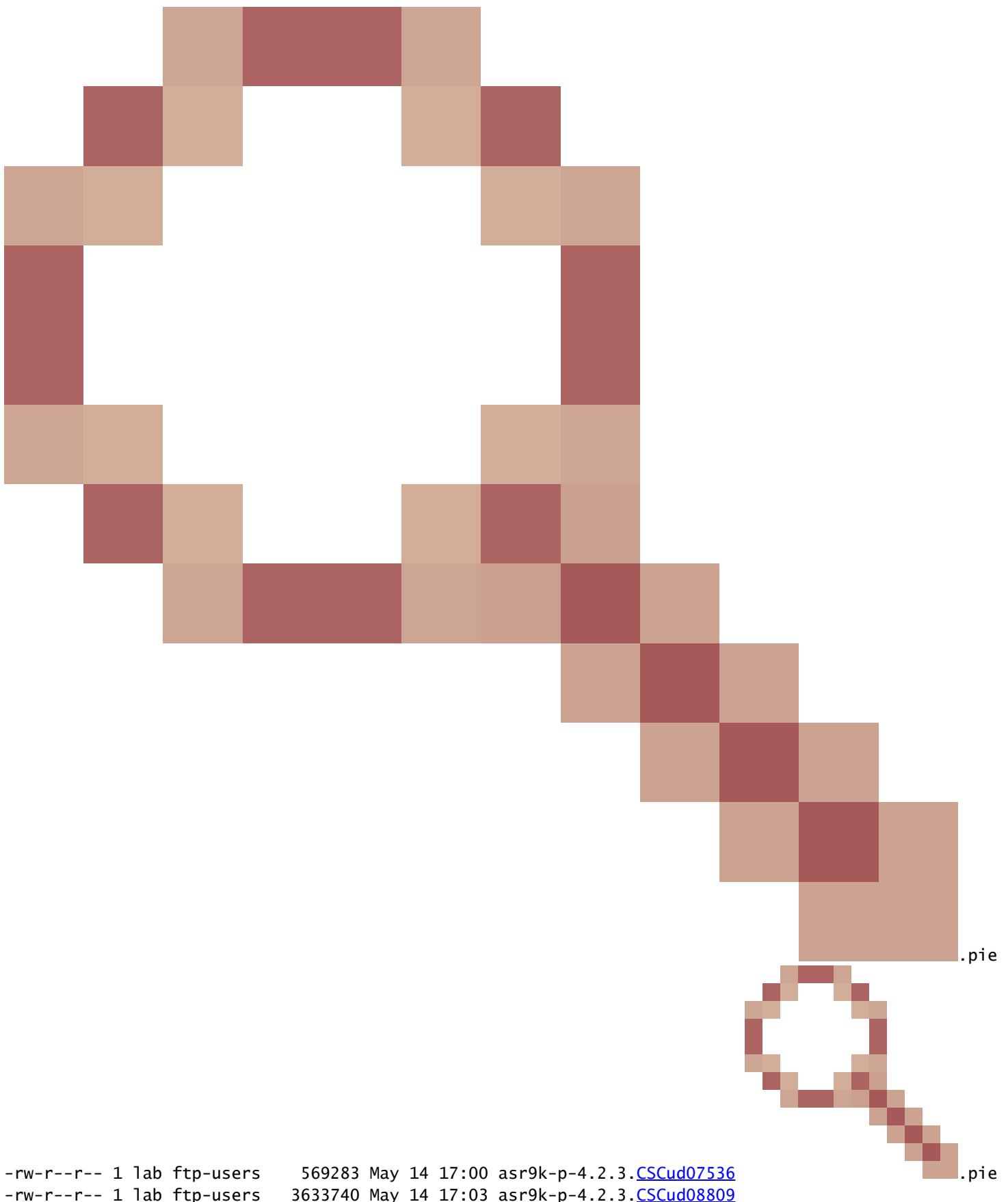
-rw-r--r-- 1 lab ftp-users   569283 May 14 17:00 asr9k-p-4.2.3.CSCud07536
-rw-r--r-- 1 lab ftp-users   3633740 May 14 17:03 asr9k-p-4.2.3.CSCud08809

.pie

.pie
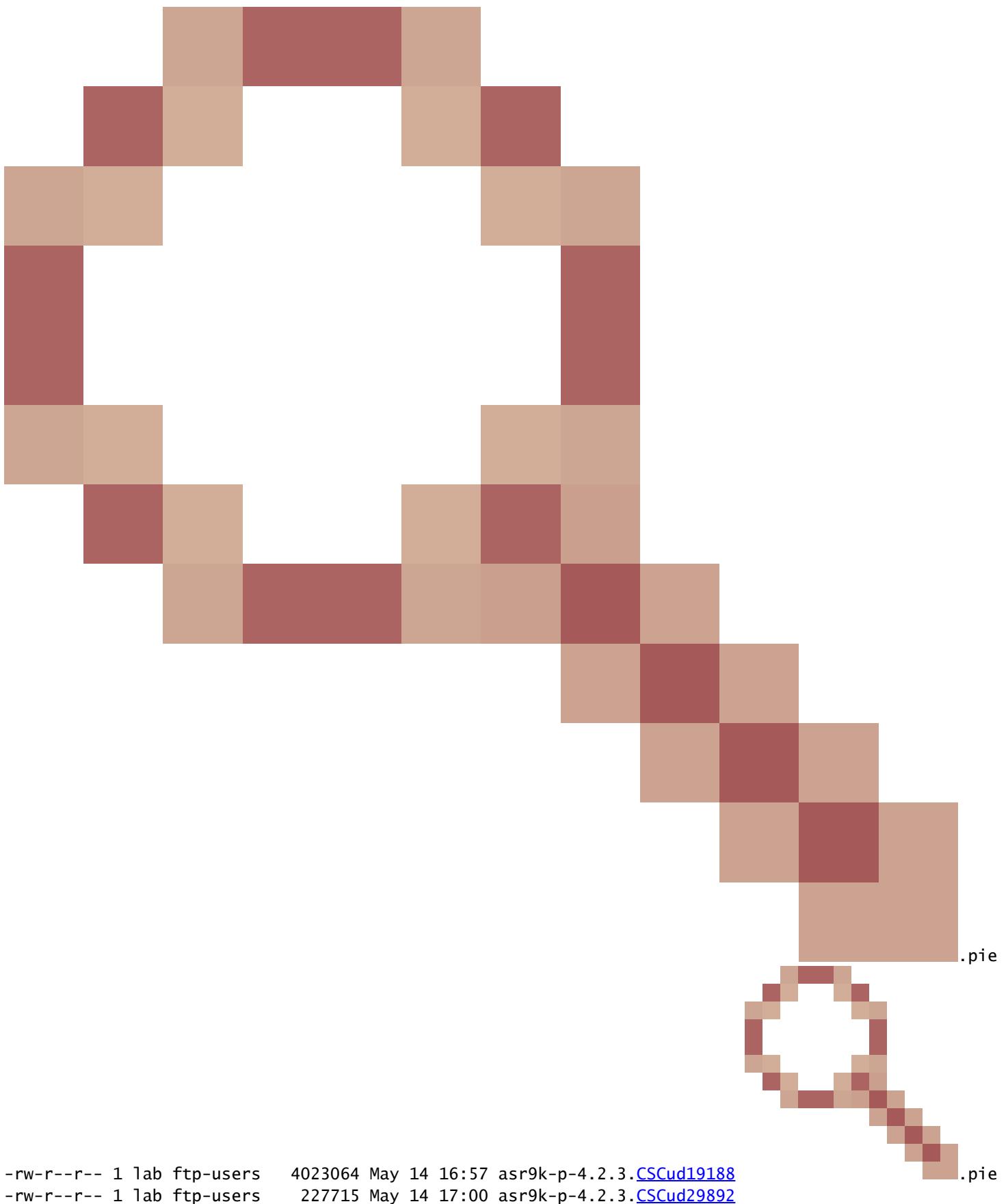
```
-rw-r--r-- 1 lab ftp-users    4023064 May 14 16:57 asr9k-p-4.2.3.CSCud19188
-rw-r--r-- 1 lab ftp-users     227715 May 14 17:00 asr9k-p-4.2.3.CSCud29892
```

.pie

.pie

-rw-r--r-- 1 lab ftp-users 52518619 May 14 16:57 asr9k-p-4.2.3.CSCud37351
-rw-r--r-- 1 lab ftp-users   2313579 May 14 16:57 asr9k-p-4.2.3.CSCud39254

.pie
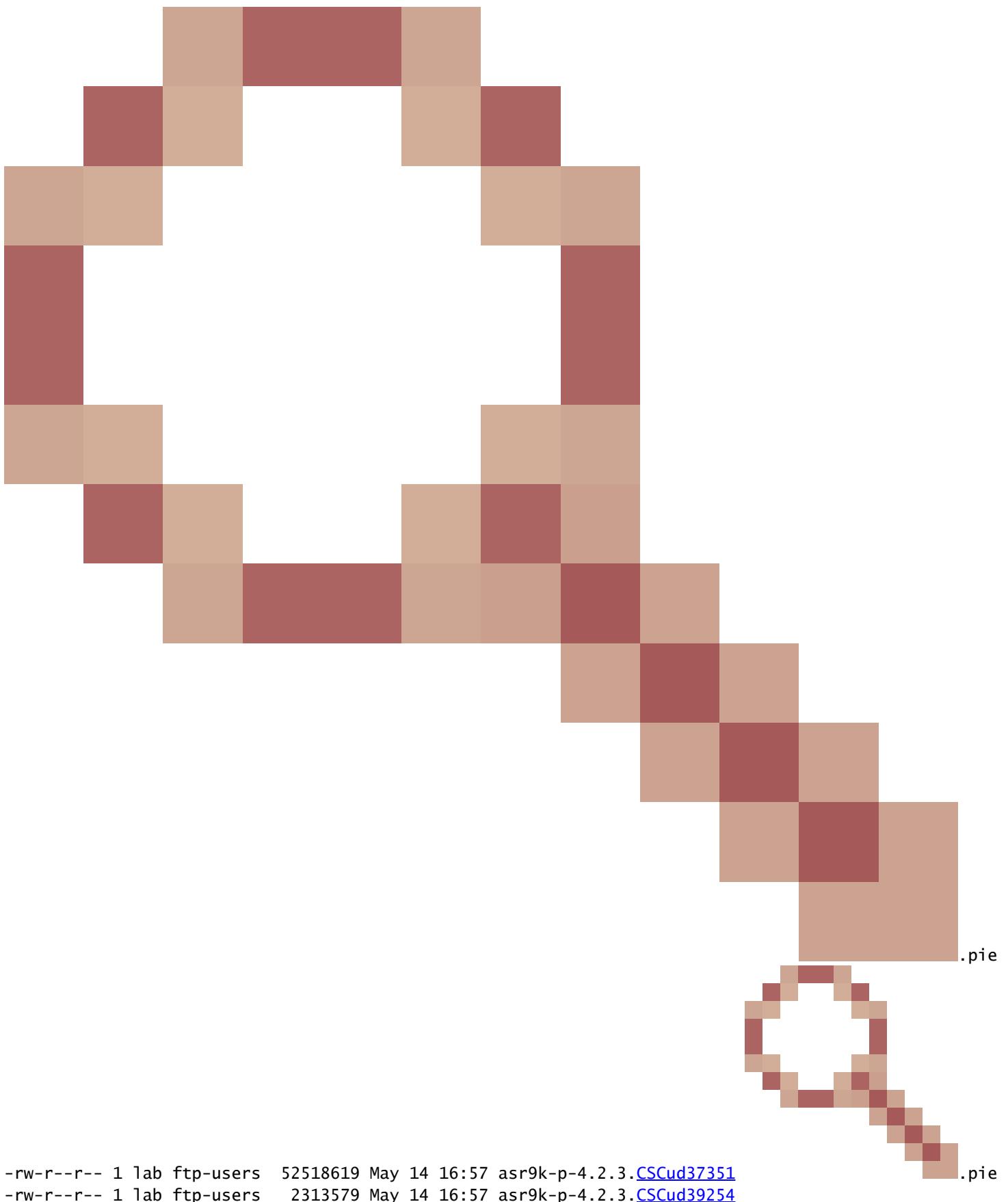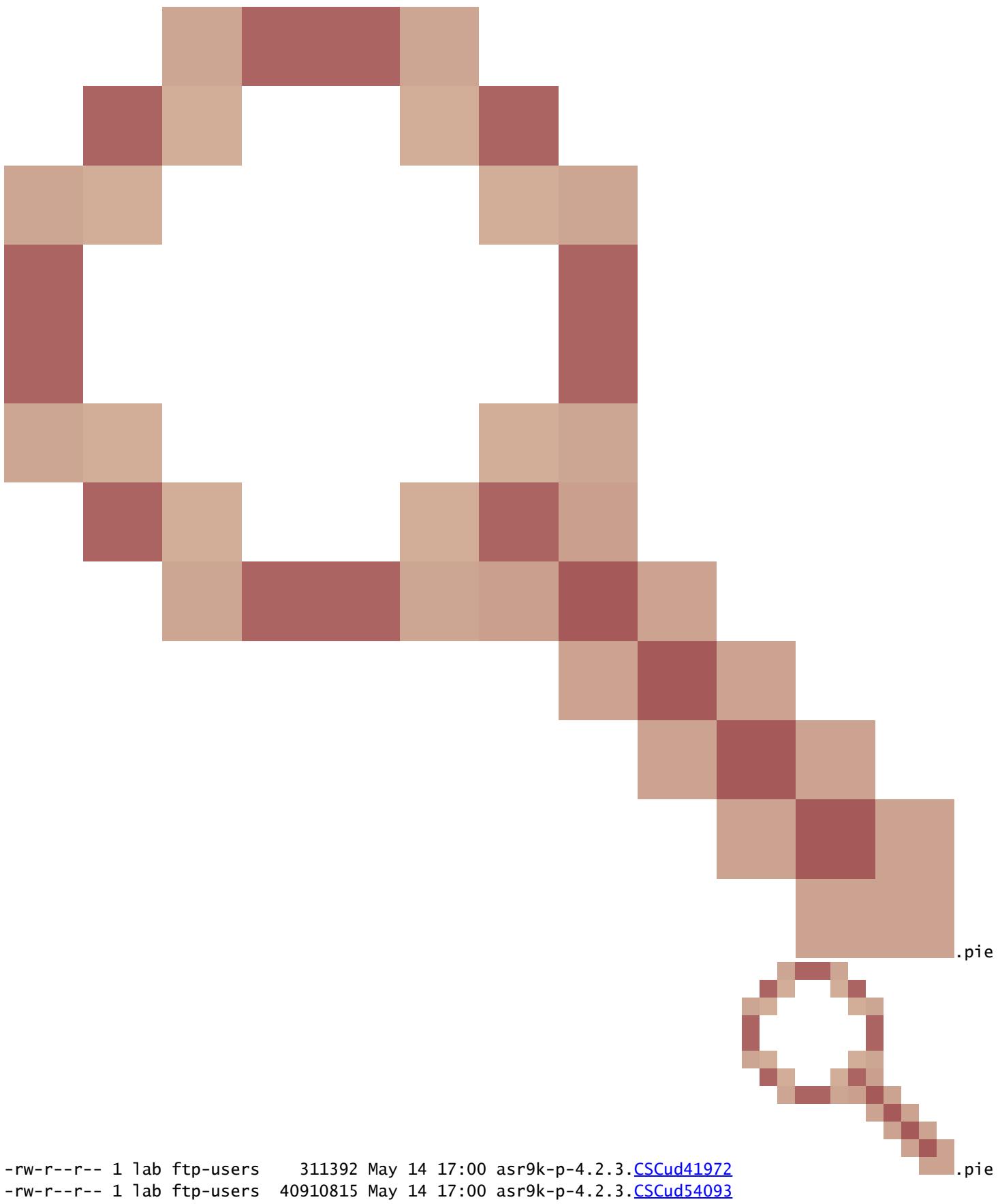
-rw-r--r-- 1 lab ftp-users   311392 May 14 17:00 asr9k-p-4.2.3.CSCud41972
-rw-r--r-- 1 lab ftp-users 40910815 May 14 17:00 asr9k-p-4.2.3.CSCud54093

.pie

.pie

.pie
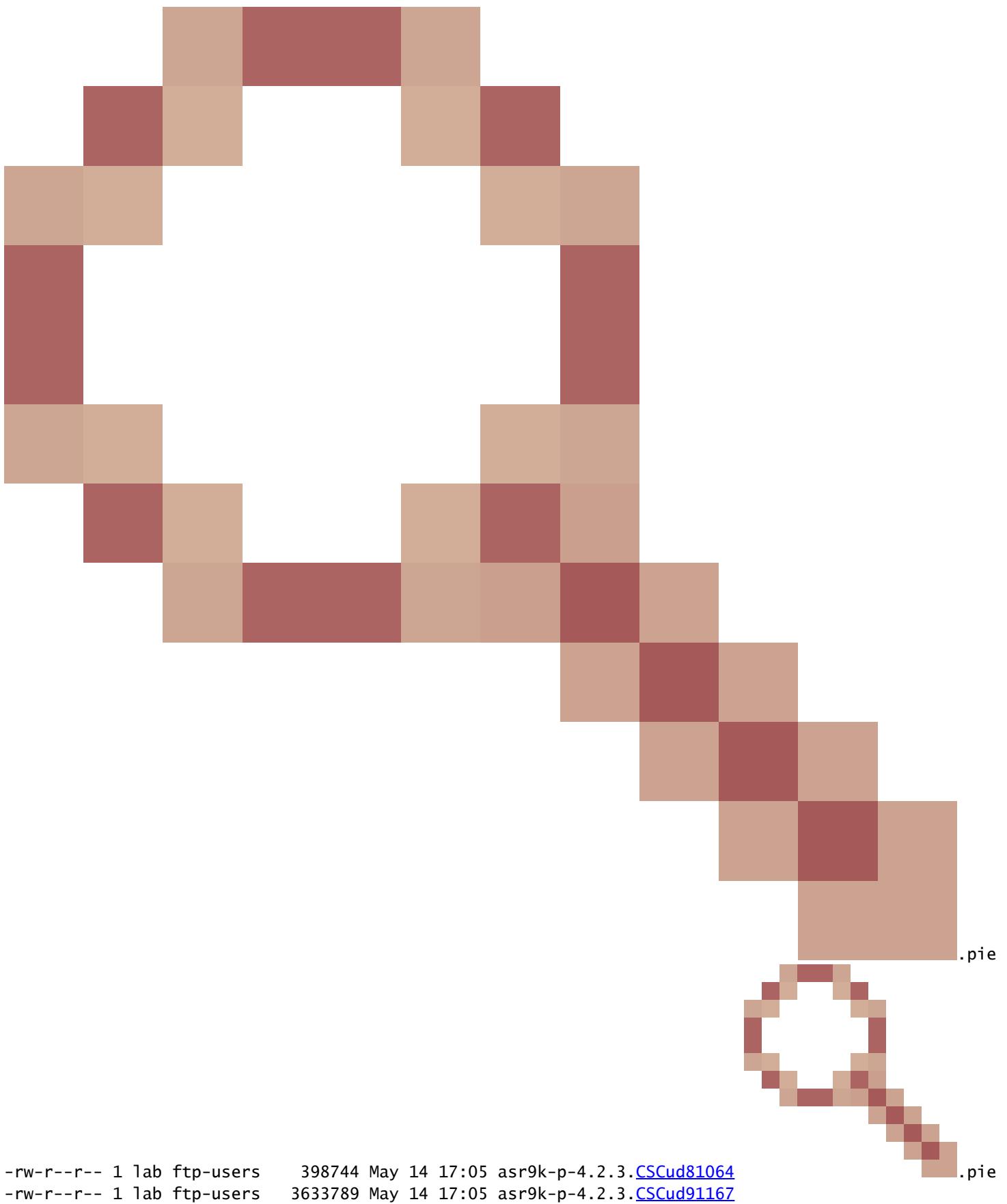
-rw-r--r-- 1 lab ftp-users   398744 May 14 17:05 asr9k-p-4.2.3.CSCud81064
-rw-r--r-- 1 lab ftp-users   3633789 May 14 17:05 asr9k-p-4.2.3.CSCud91167

.pie

.pie

```
-rw-r--r-- 1 lab ftp-users    724868 May 14 17:00 asr9k-p-4.2.3.CSCud98419
-rw-r--r-- 1 lab ftp-users    483381 May 14 17:00 asr9k-p-4.2.3.CSCue21593
```

.pie
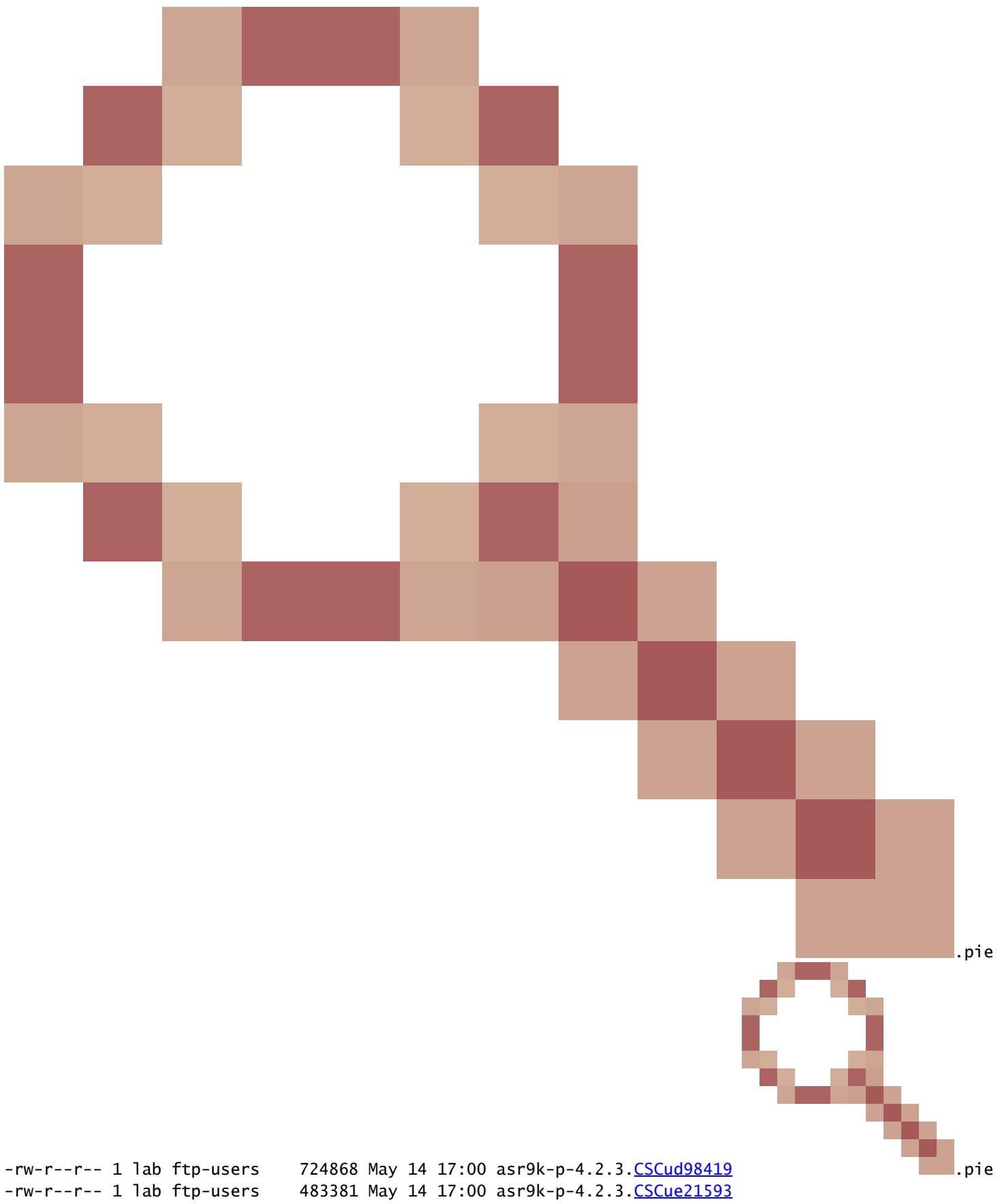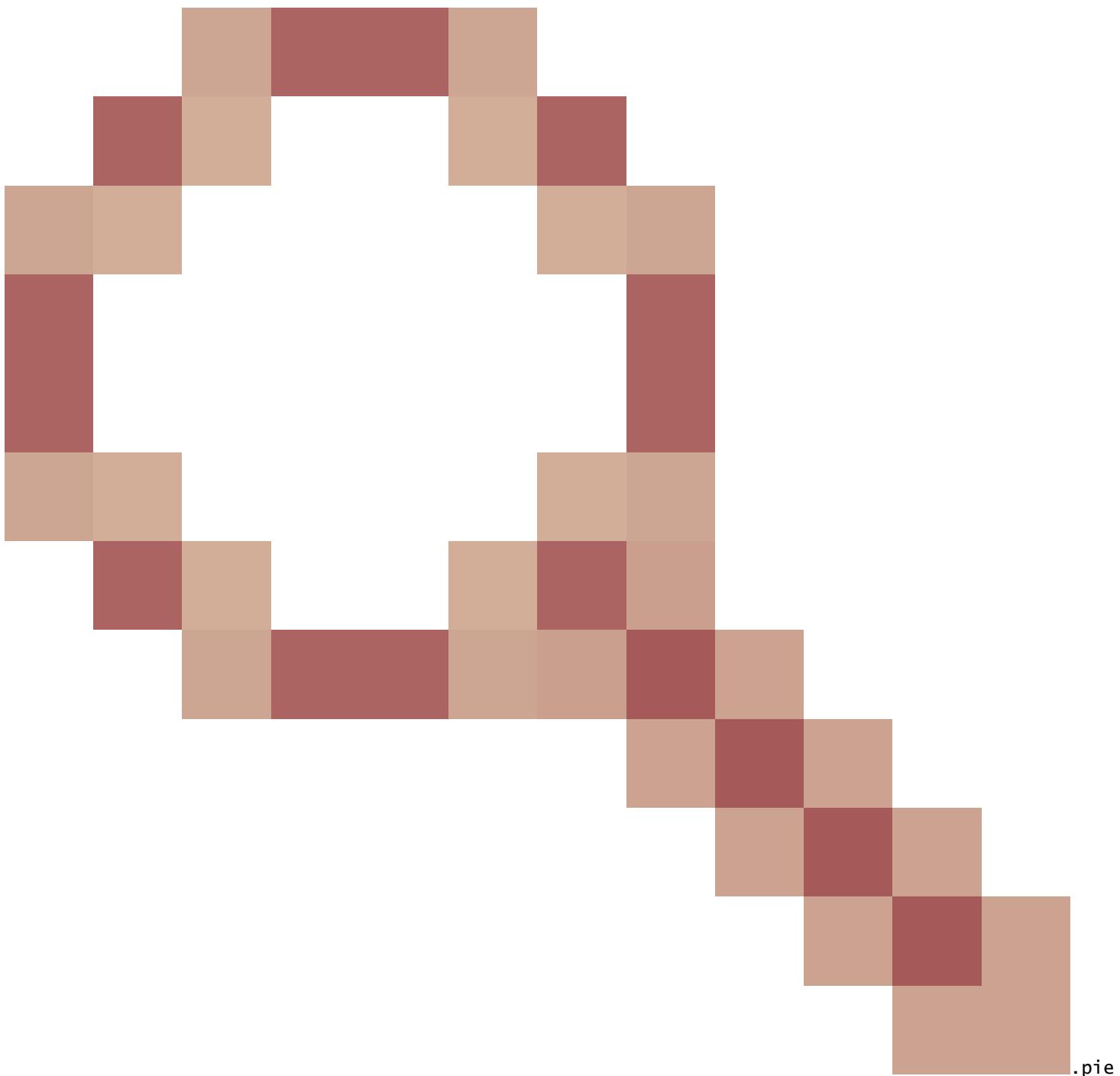
-rw-r--r-- 1 lab ftp-users 160204800 May 14 17:36 custom-tarball

```
RP/0/RSP0/CPU0:ASR9006(admin)#install add tar
   tftp://10.0.0.1/4.2.3/custom/custom-tarball
Tue May 14 17:50:51.535 EDT
Install operation 86 '(admin) install add tar
   /tftp://10.0.0.1/4.2.3/custom/custom-tarball'
   started by user 'root' via CLI at 17:50:51 EDT Tue May 14 2013.
Info:      The following files were extracted from the tar file
           '/tftp://10.0.0.1/4.2.3/custom/custom-tarball' and will be added
           to the entire router:
Info:
Info:          asr9k-p-4.2.3.CSCub22596
```
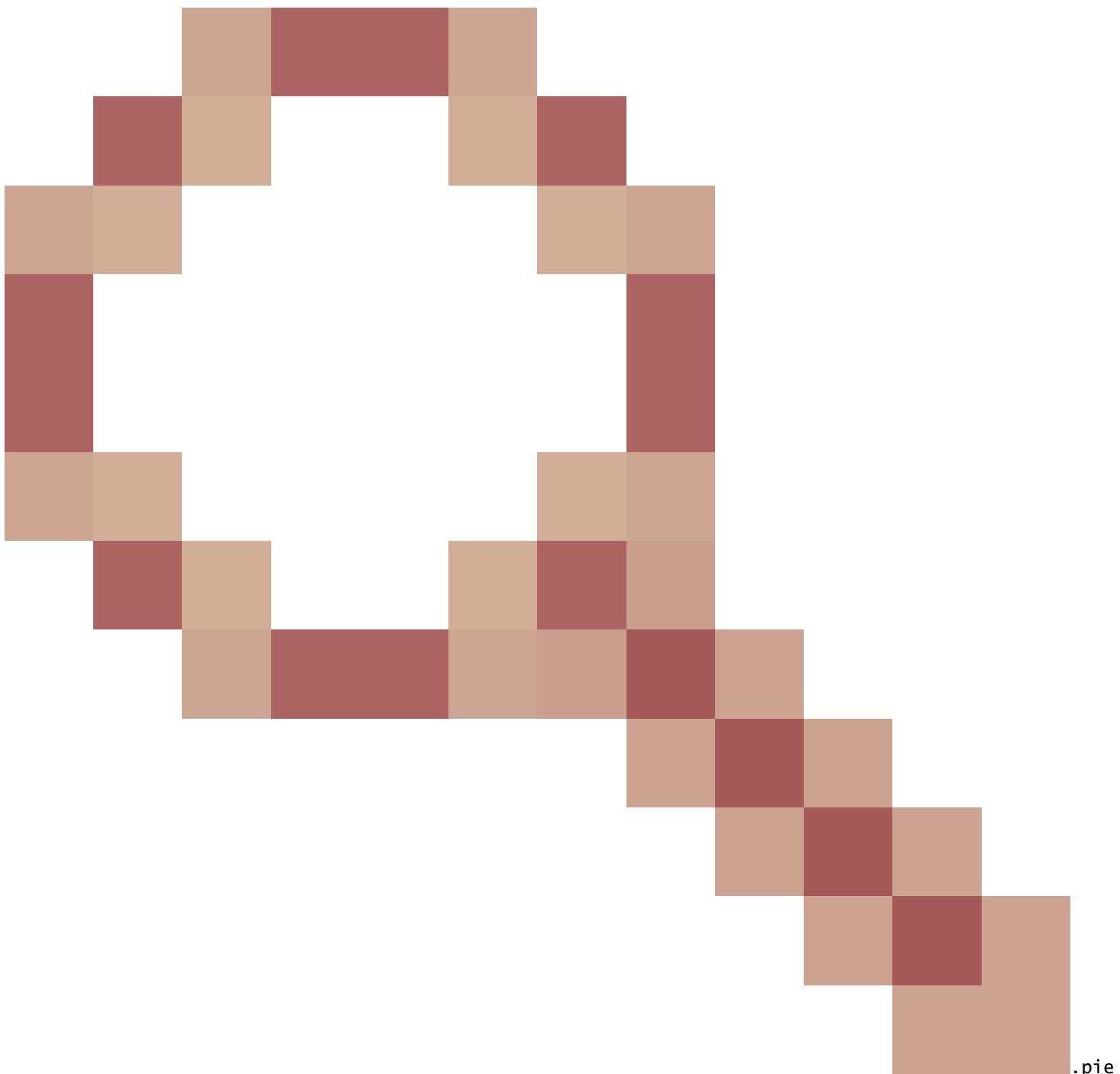
Info: asr9k-p-4.2.3.CSCub30046.pie
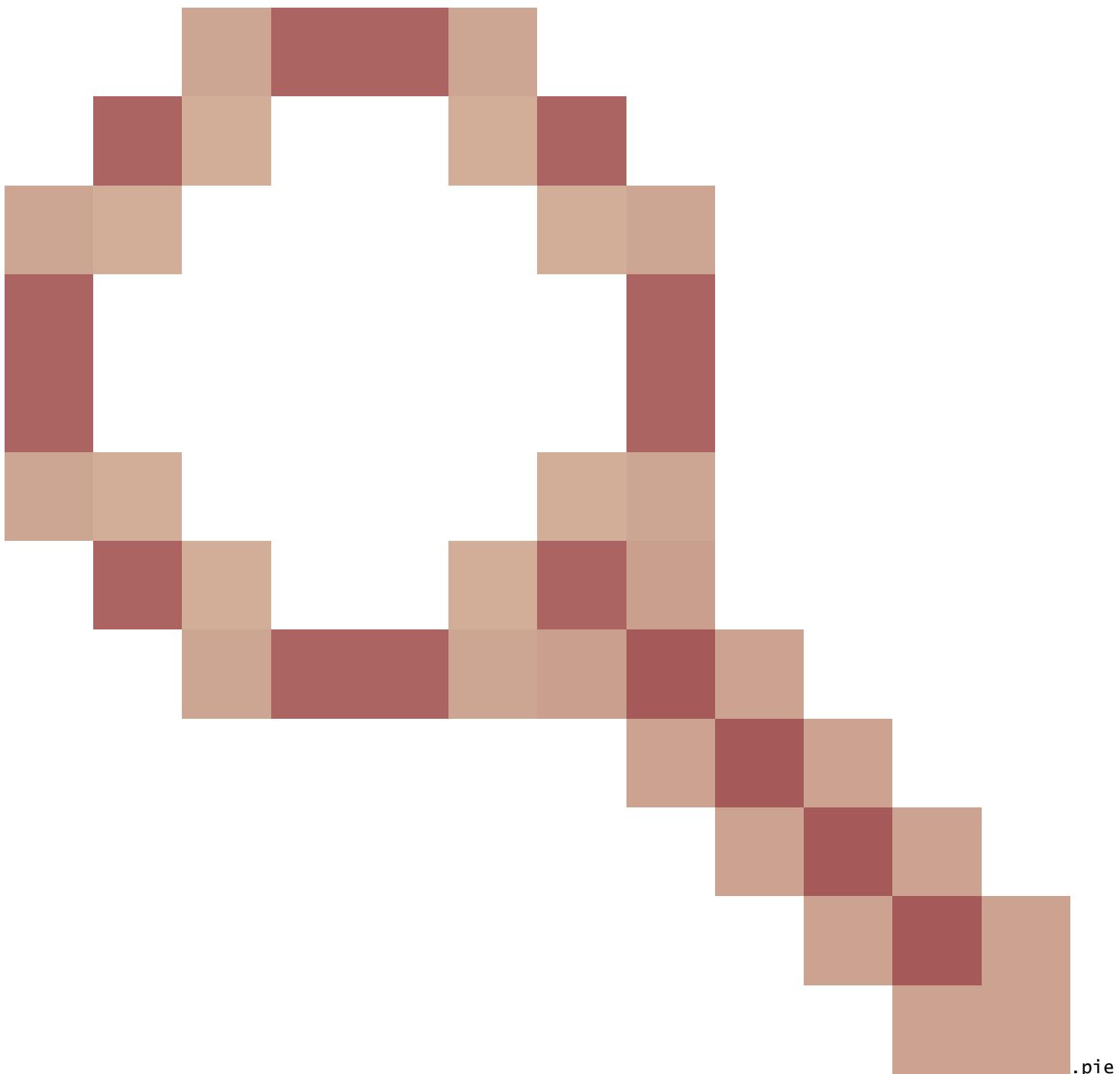
Info: asr9k-p-4.2.3.CSCub74517.pie
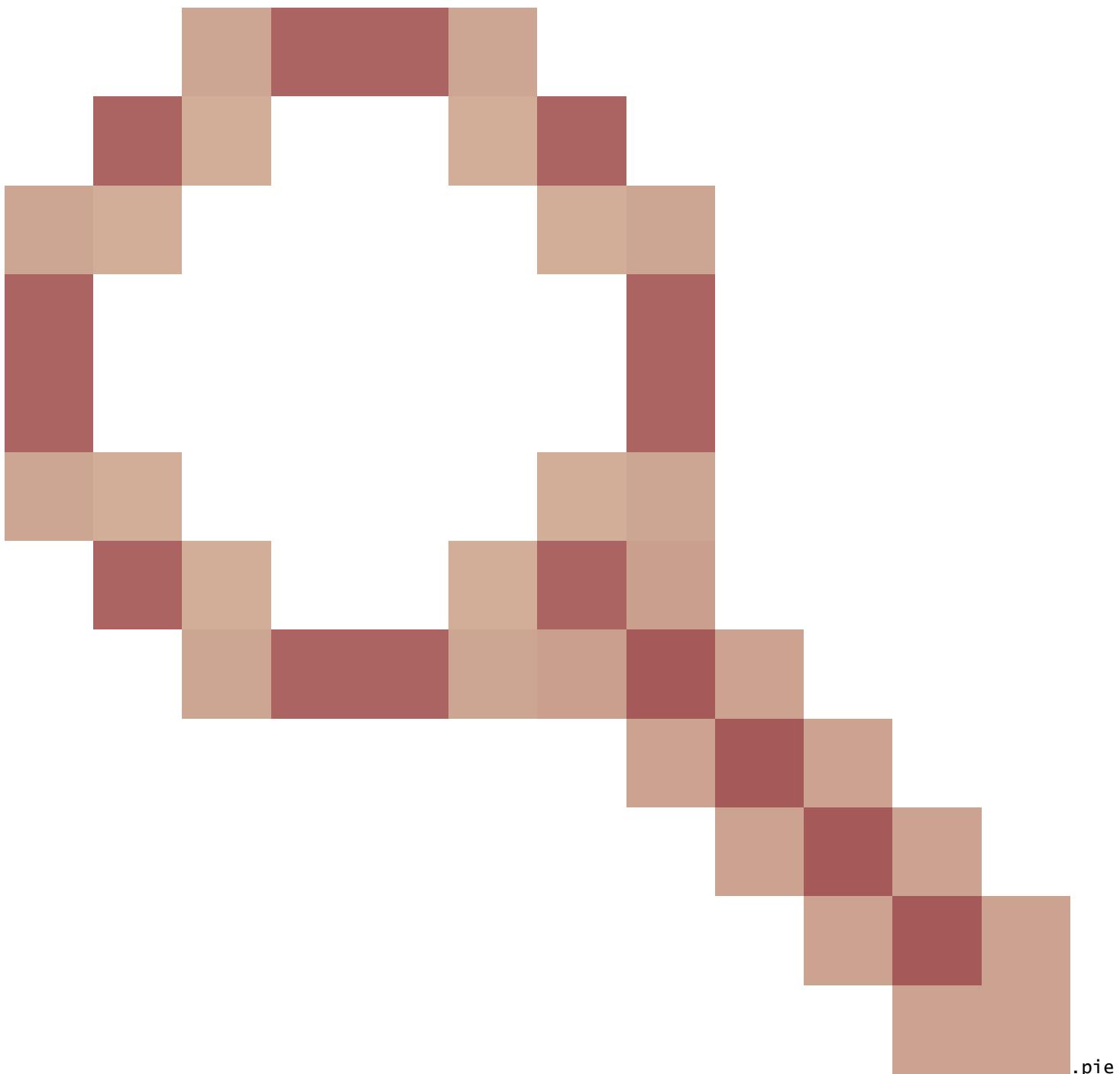
Info: asr9k-p-4.2.3.[CSCub96985].pie
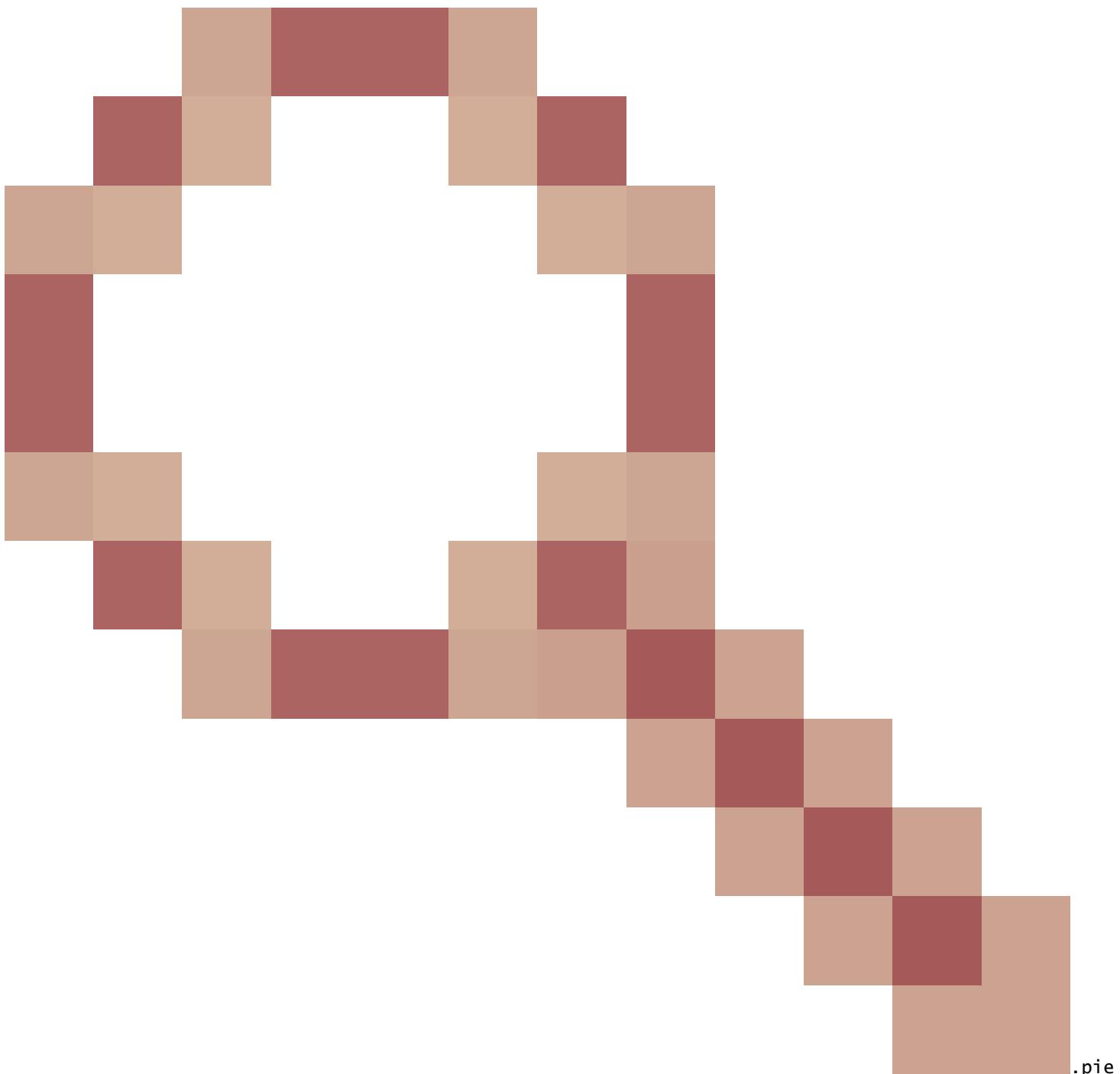
Info: asr9k-p-4.2.3.CSCuc59492.pie
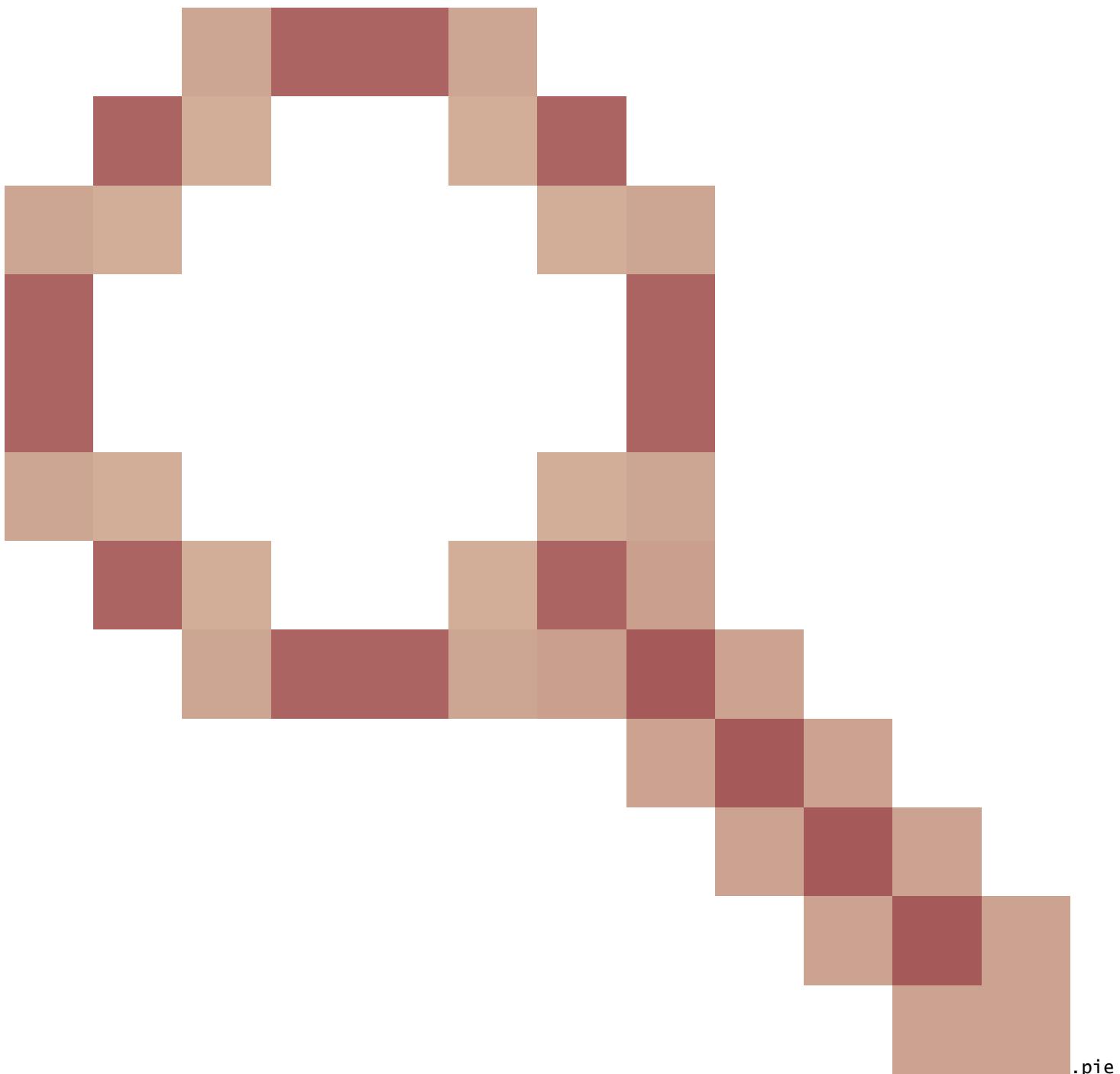
Info: asr9k-p-4.2.3.[CSCuc84257](.pie)
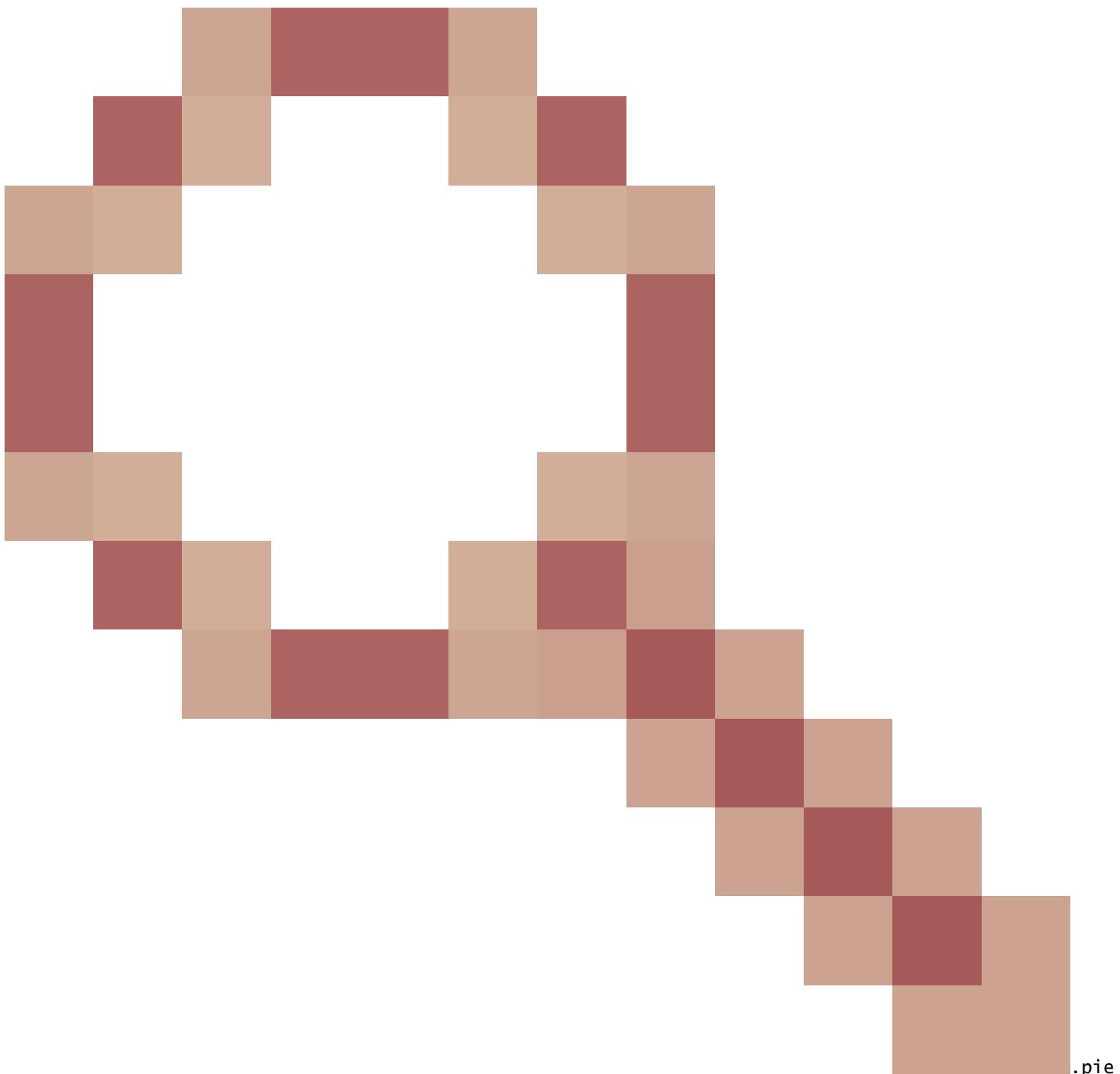
Info: asr9k-p-4.2.3.[CSCud07536](#).pie
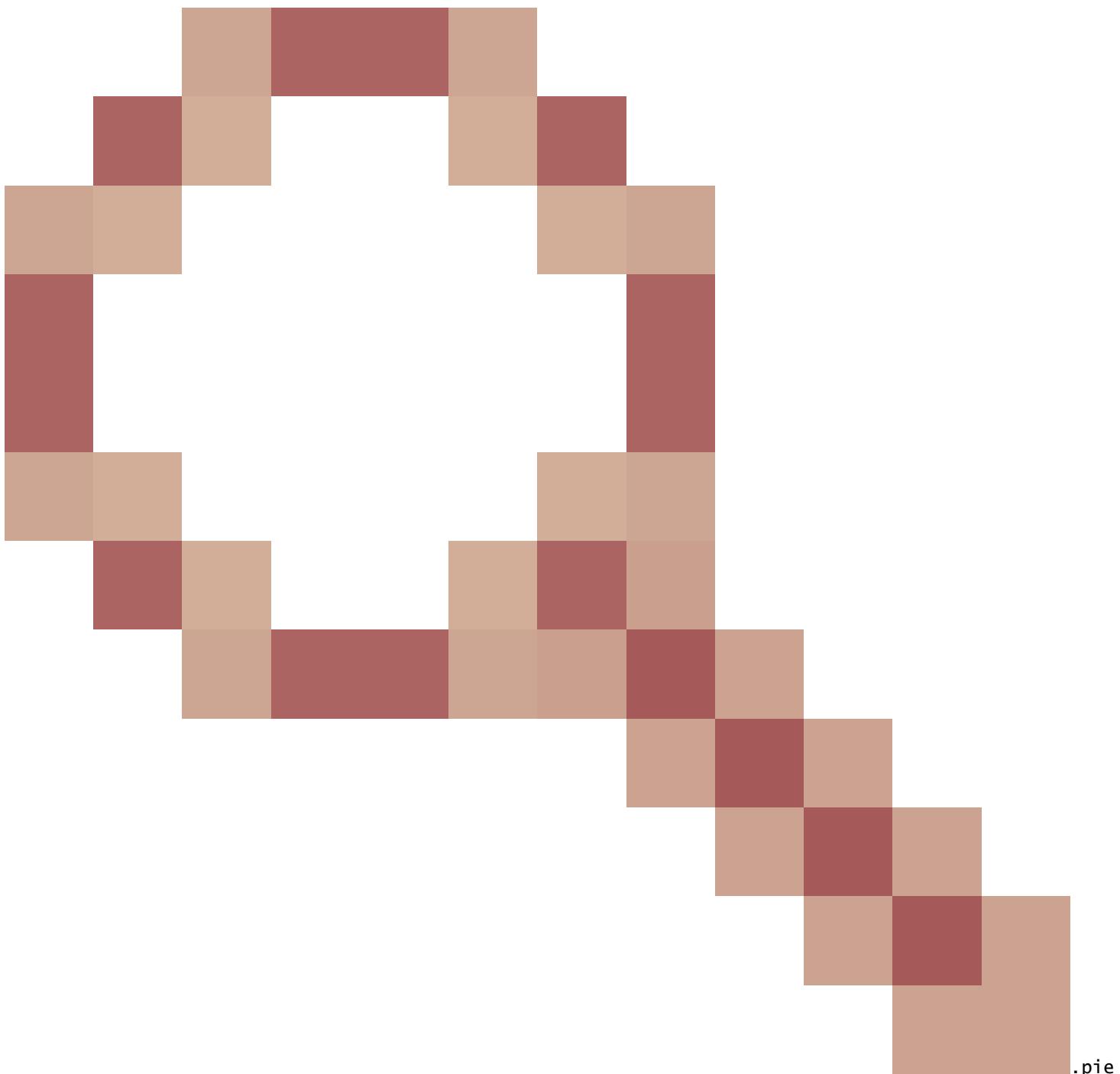
Info: asr9k-p-4.2.3.[CSCud08809](#).pie
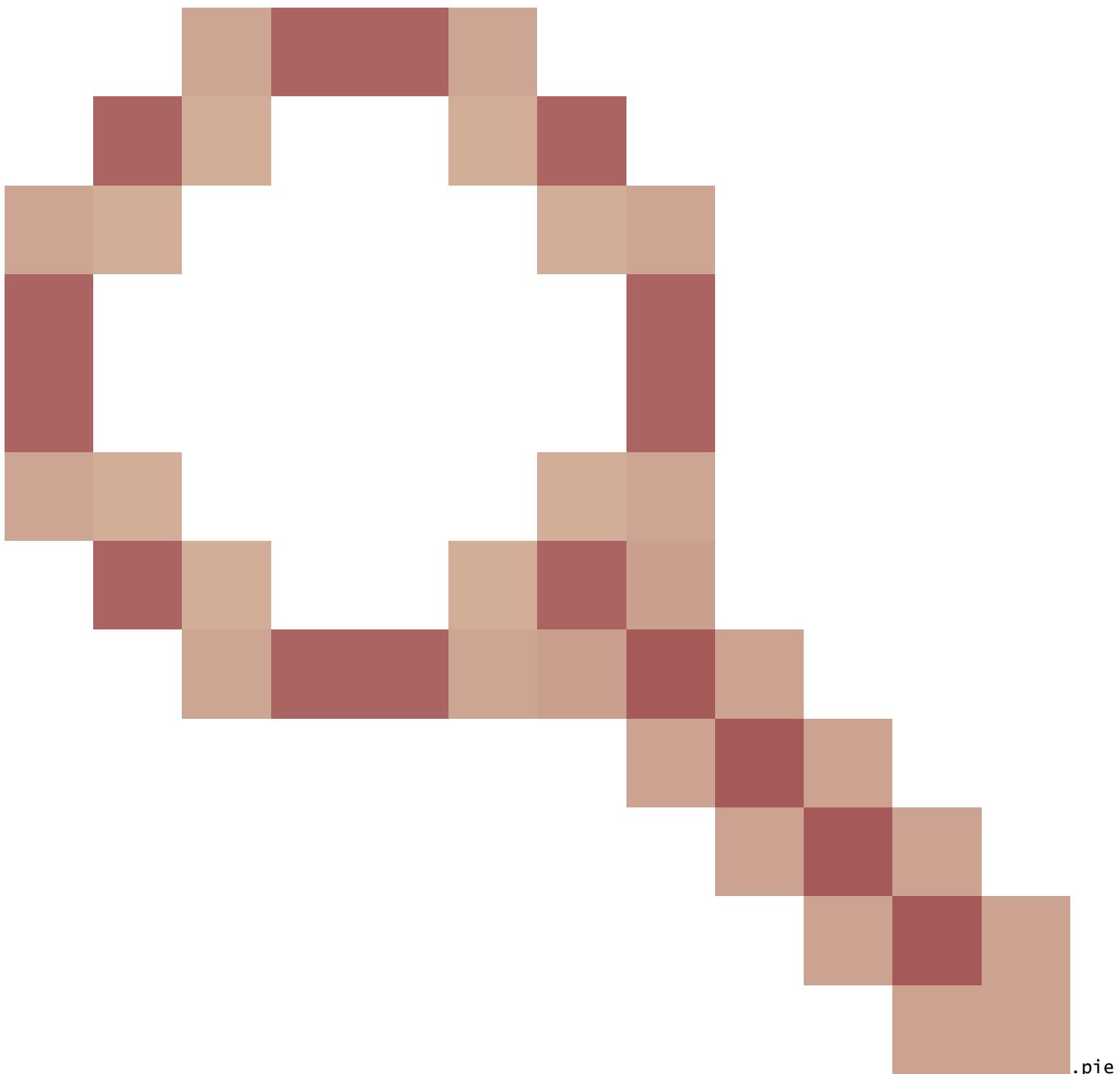
Info: asr9k-p-4.2.3.[CSCud19188](#).pie
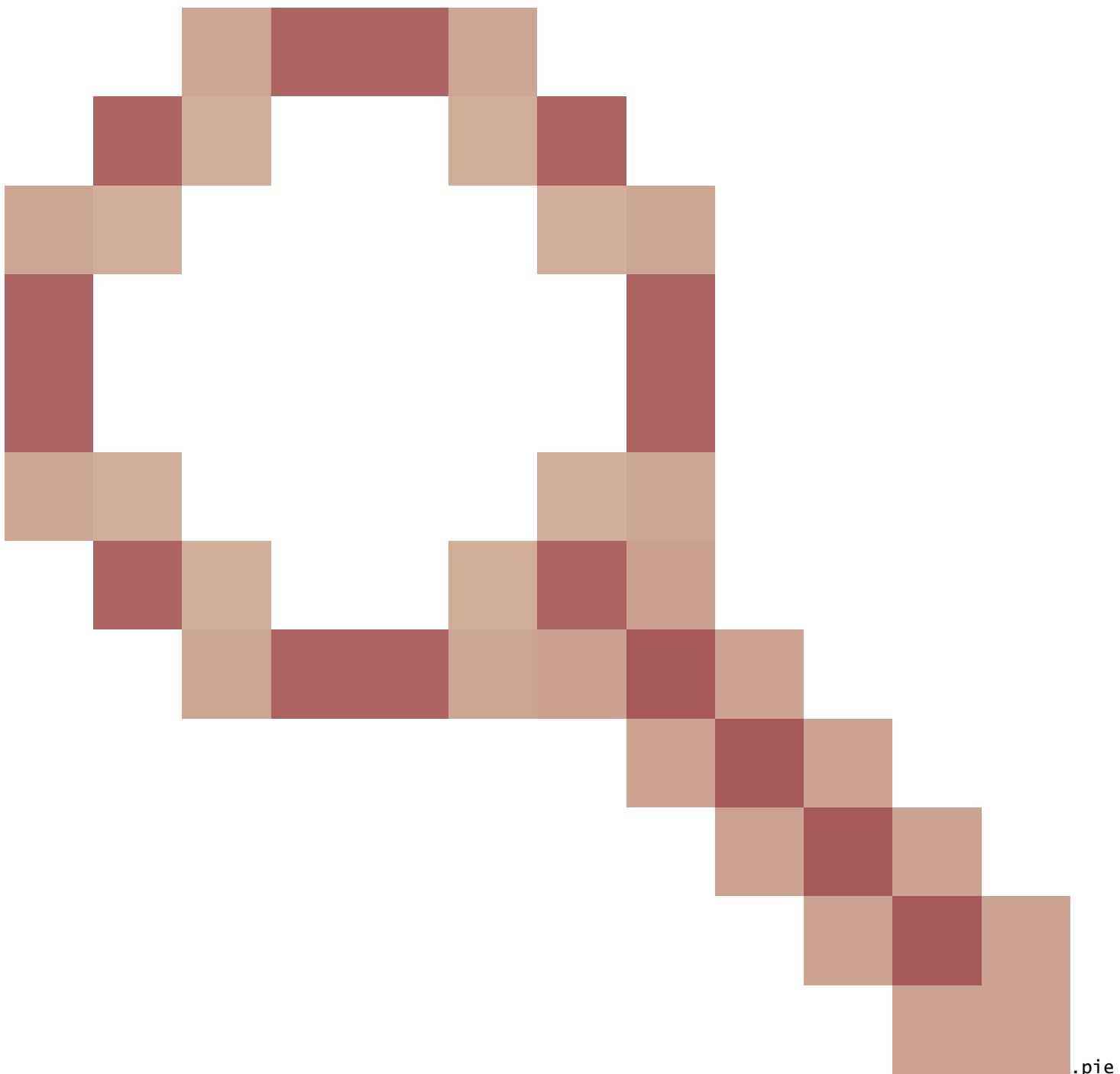
Info: asr9k-p-4.2.3.CSCud29892.pie
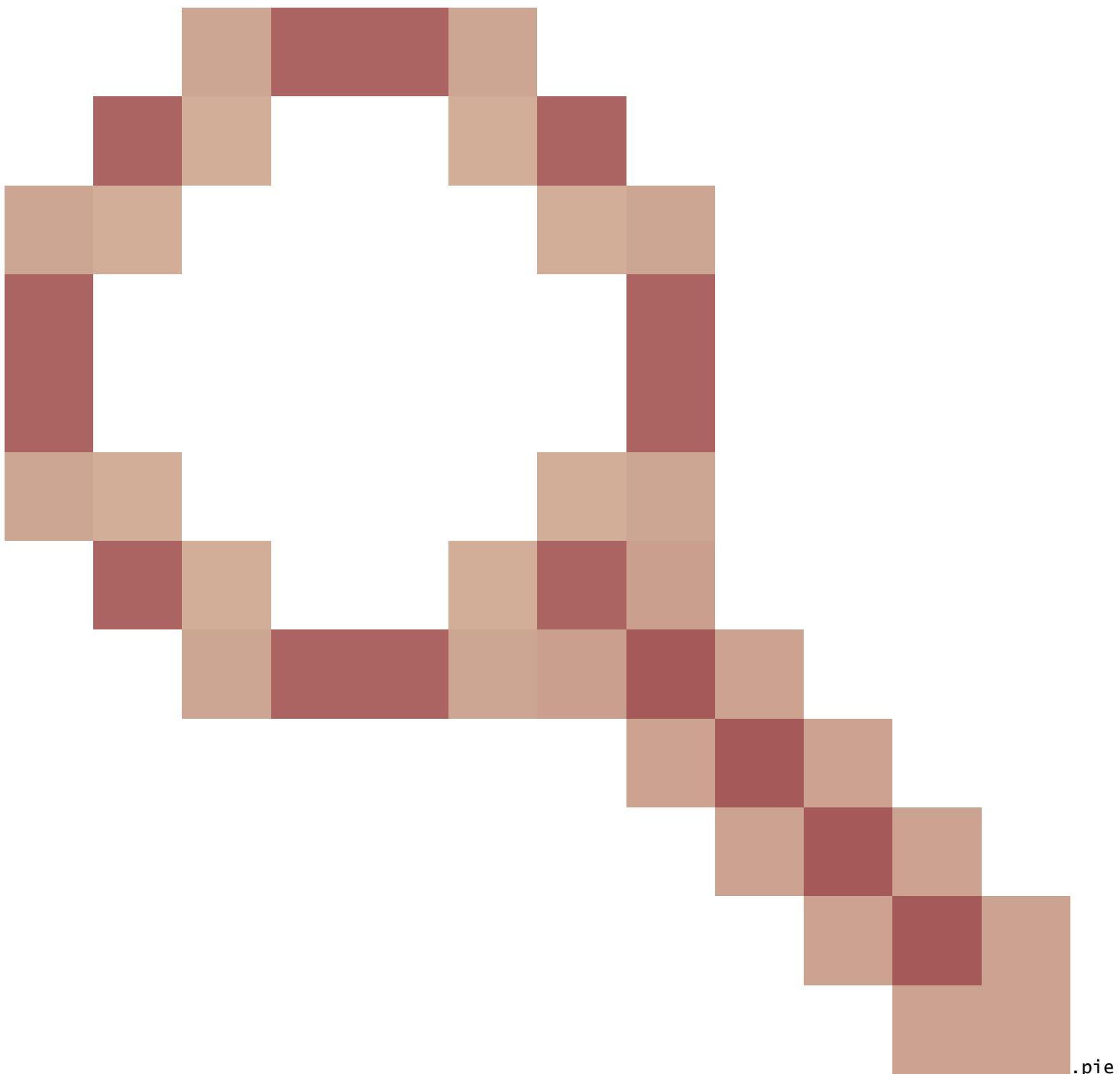
Info: asr9k-p-4.2.3.[CSCud37351](#).pie
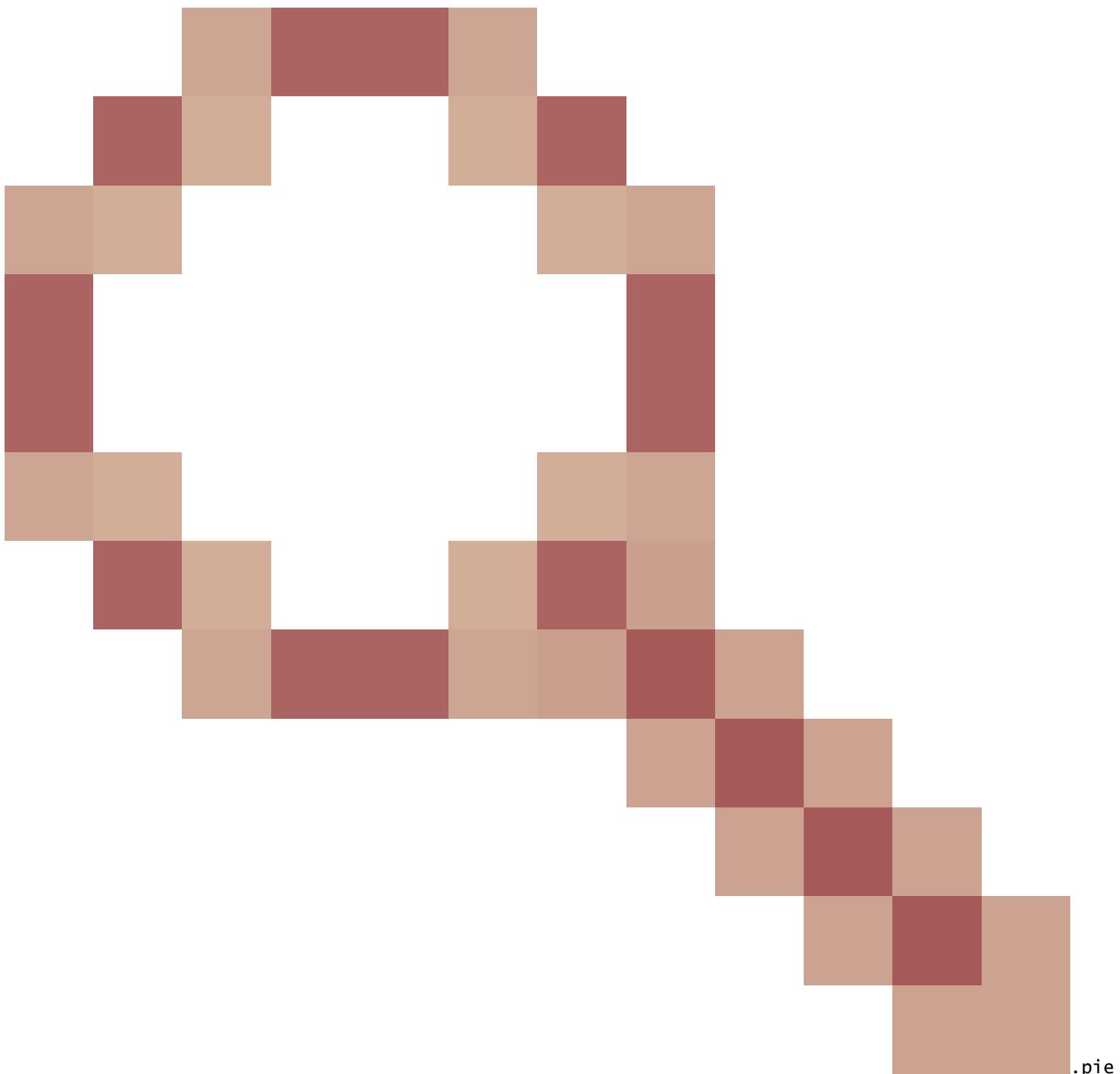
Info: asr9k-p-4.2.3.CSCud39254.pie
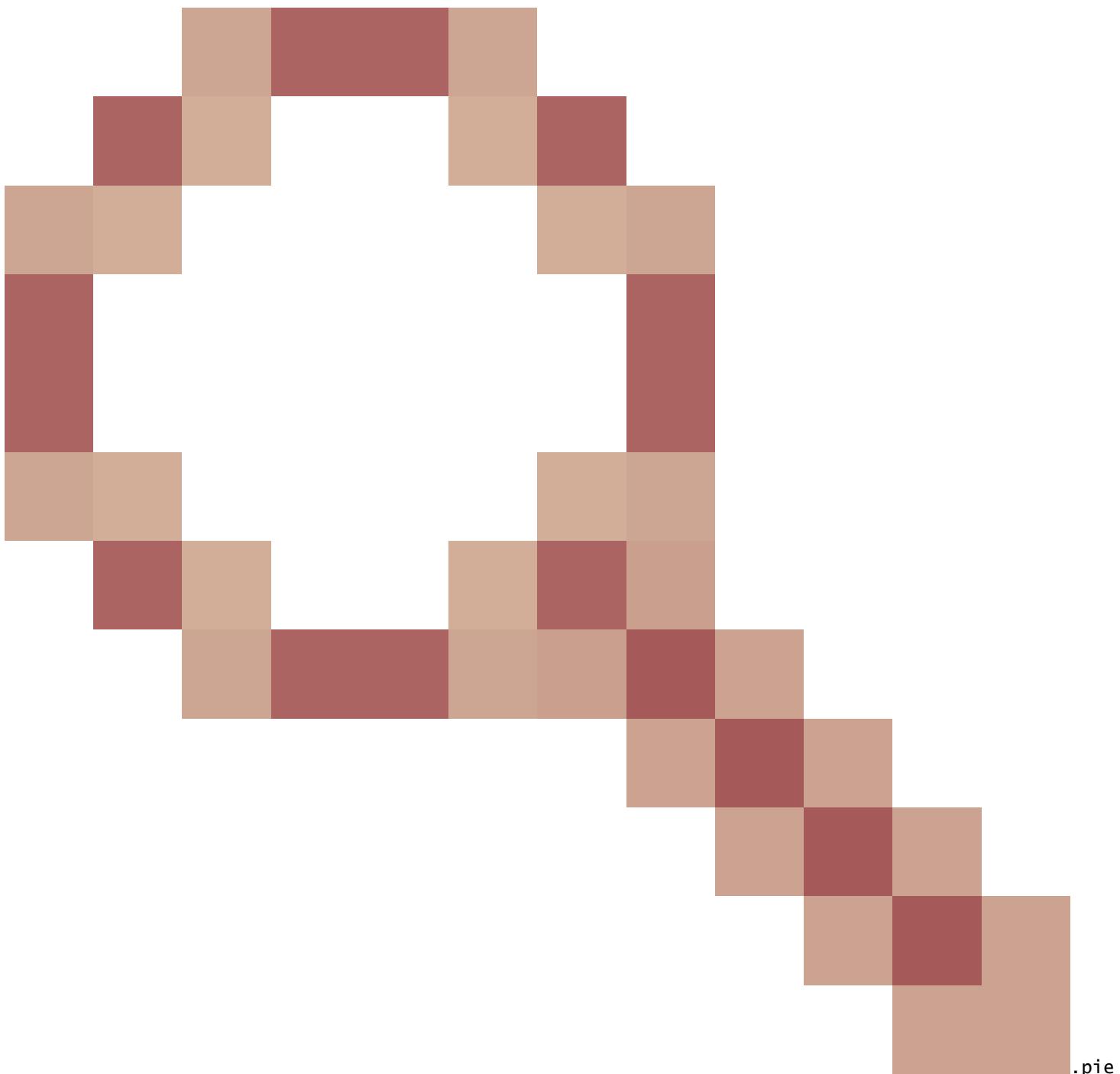
Info: asr9k-p-4.2.3.CSCud41972.pie
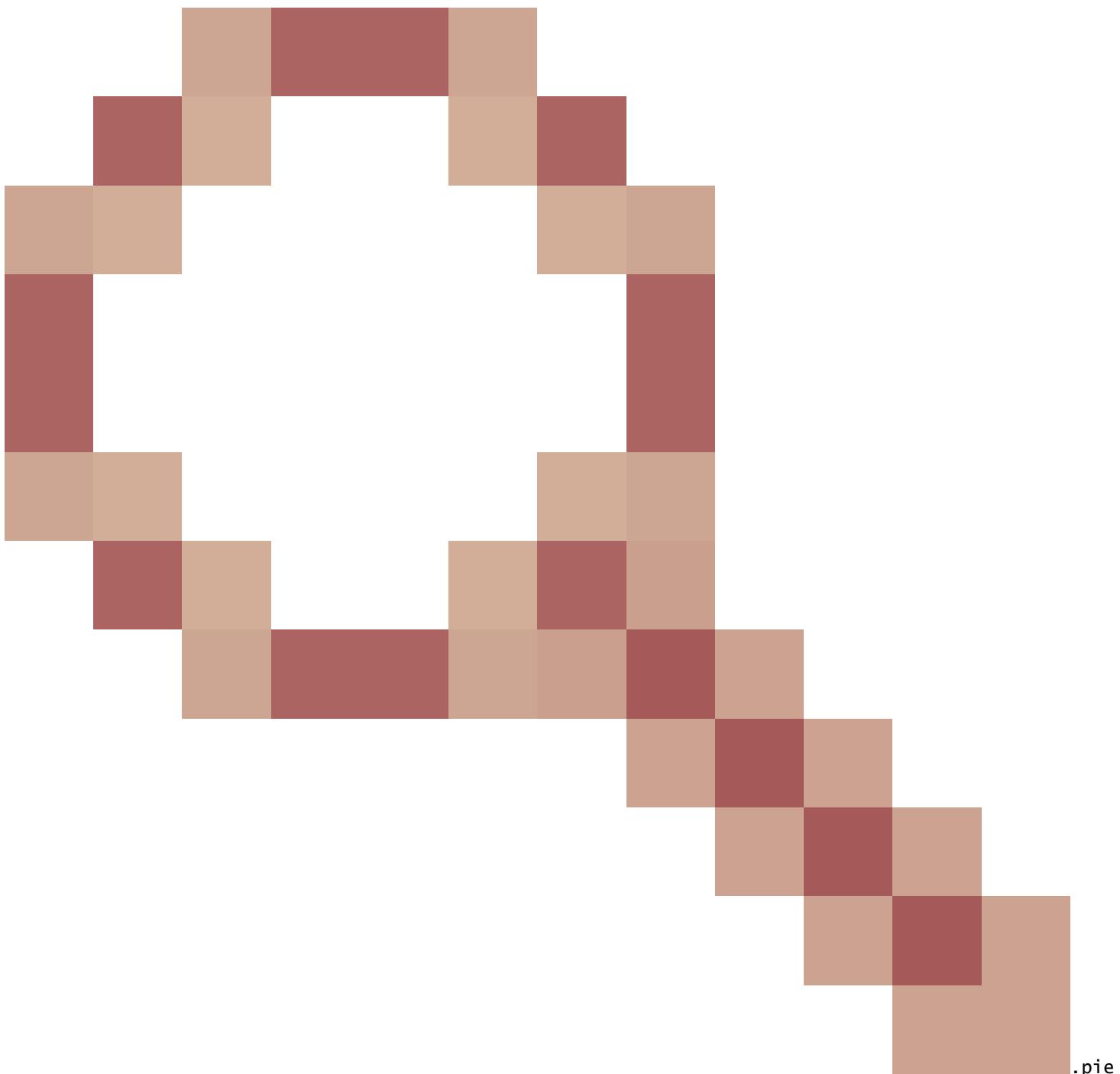
Info: asr9k-p-4.2.3.CSCud54093.pie
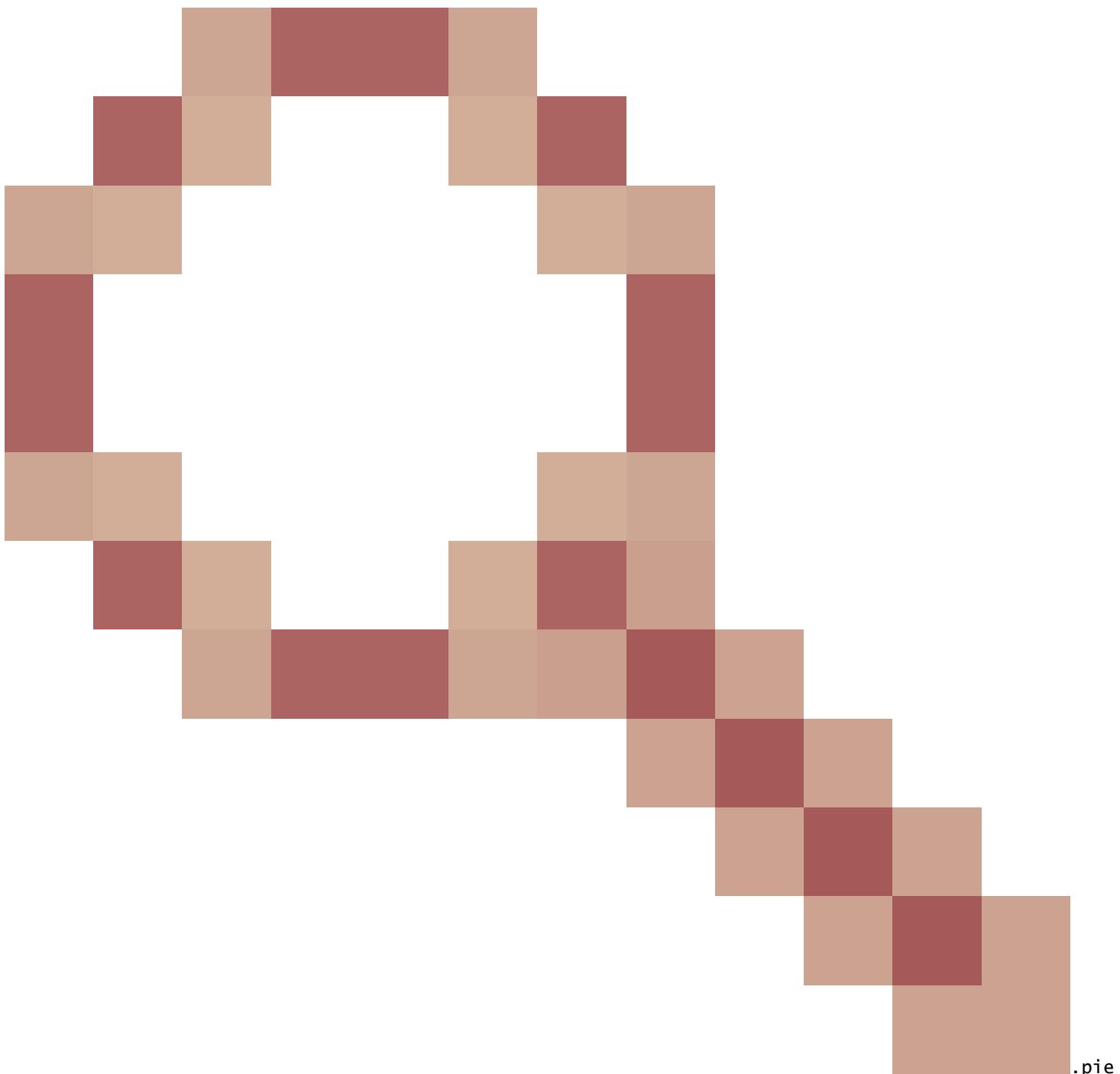
Info: asr9k-p-4.2.3.CSCud81064.pie
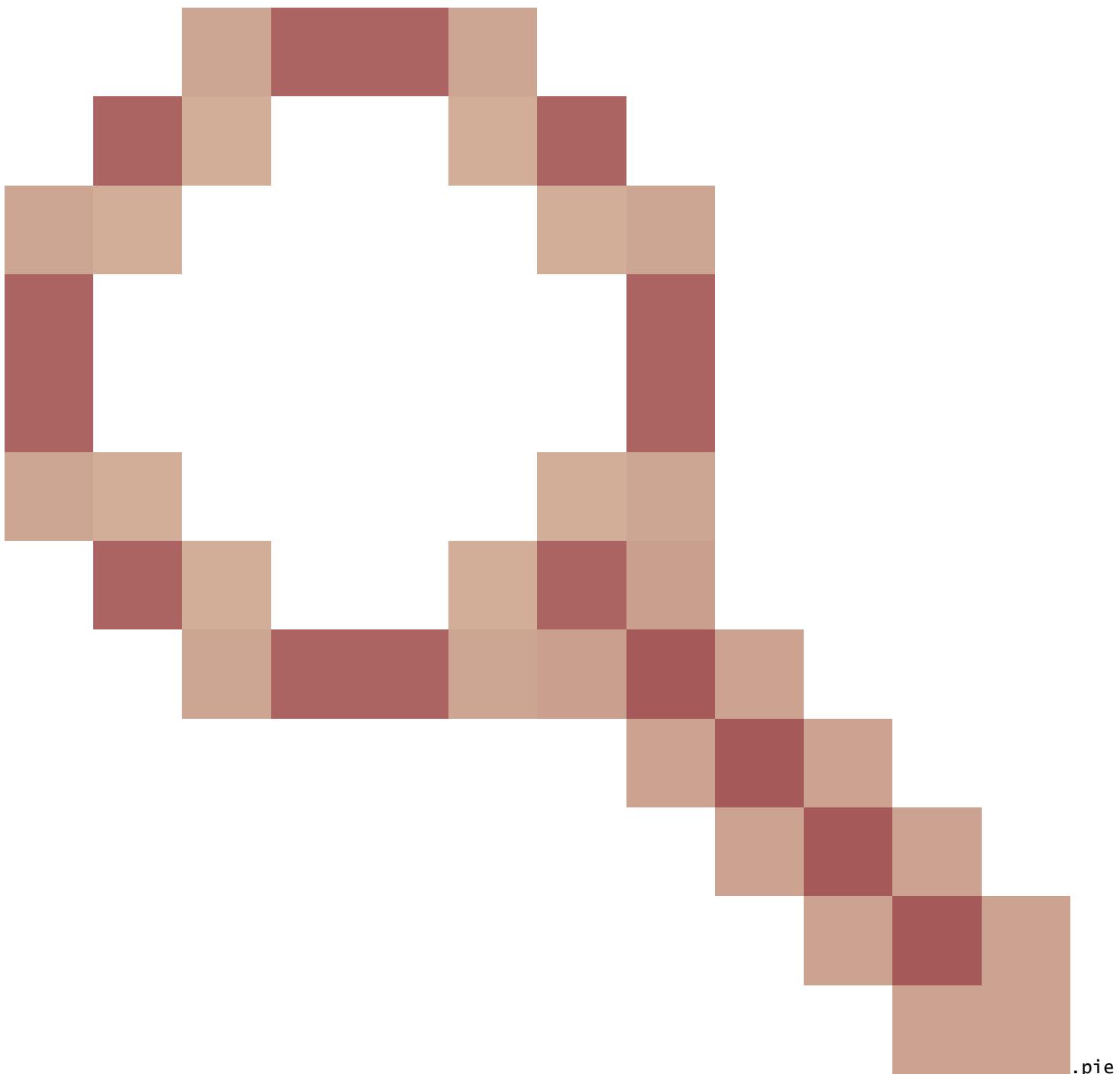
Info: asr9k-p-4.2.3.CSCud91167.pie
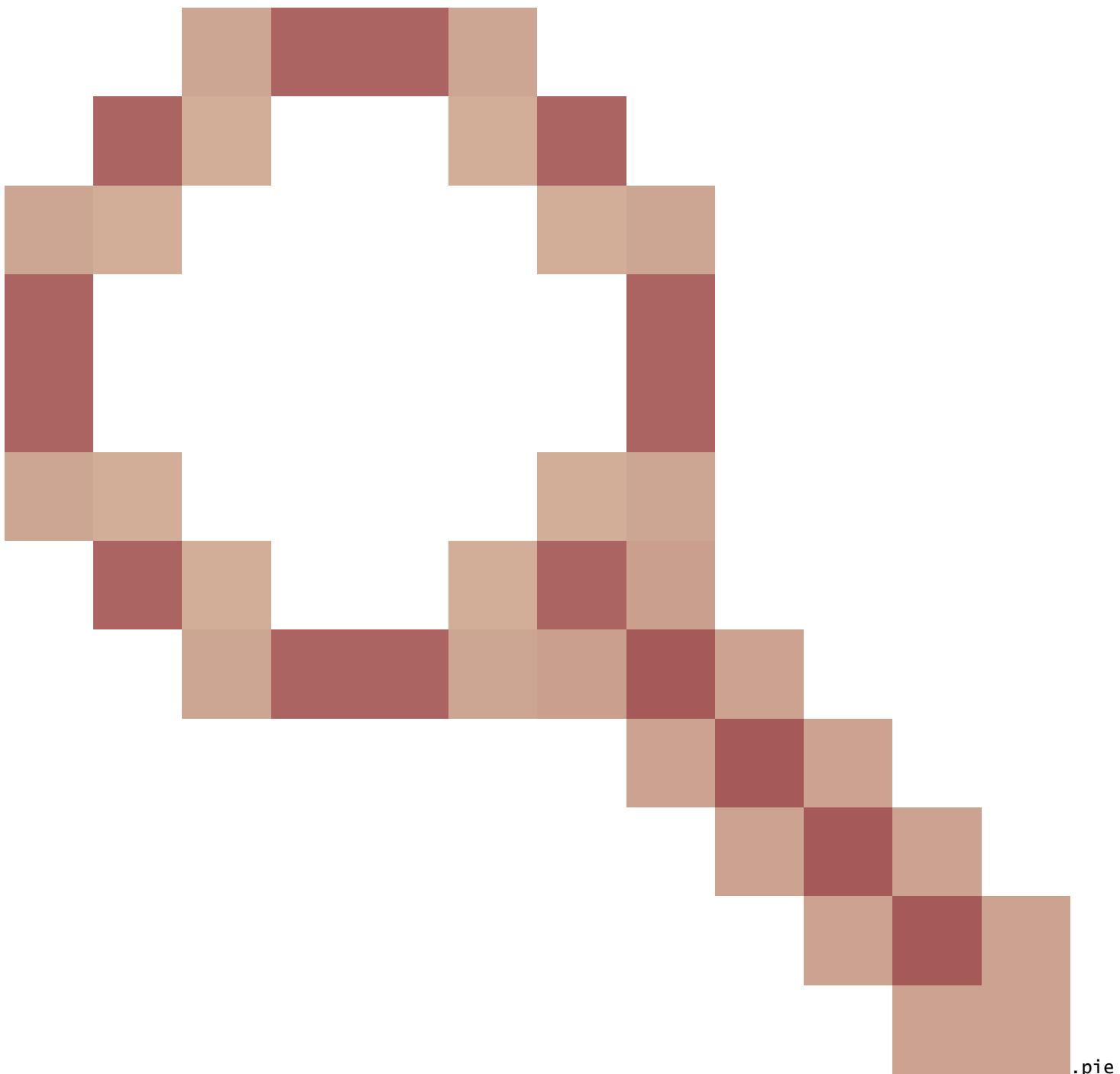
Info: asr9k-p-4.2.3.CSCud98419.pie
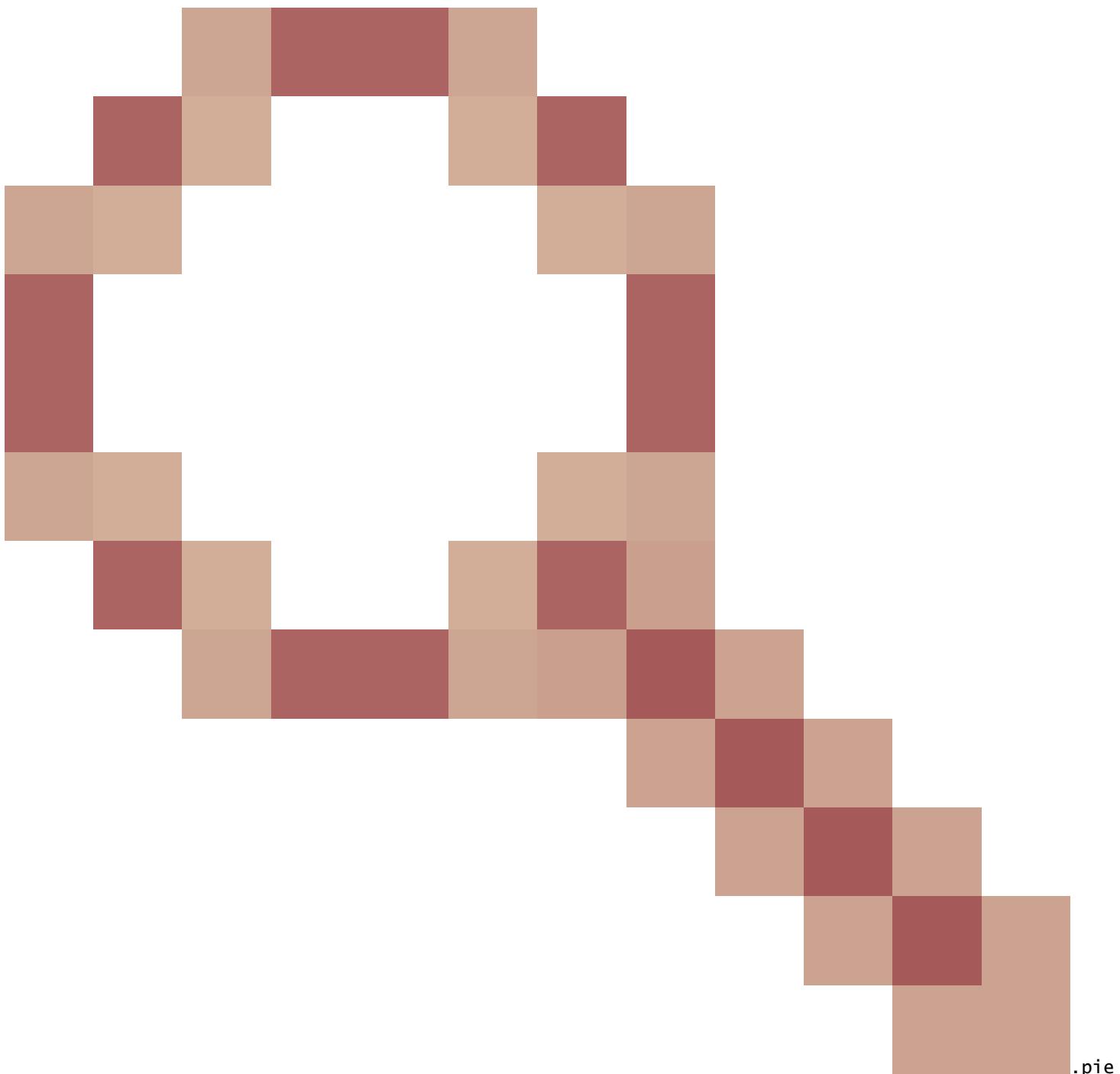
Info: asr9k-p-4.2.3.CSCue21593.pie

.pie
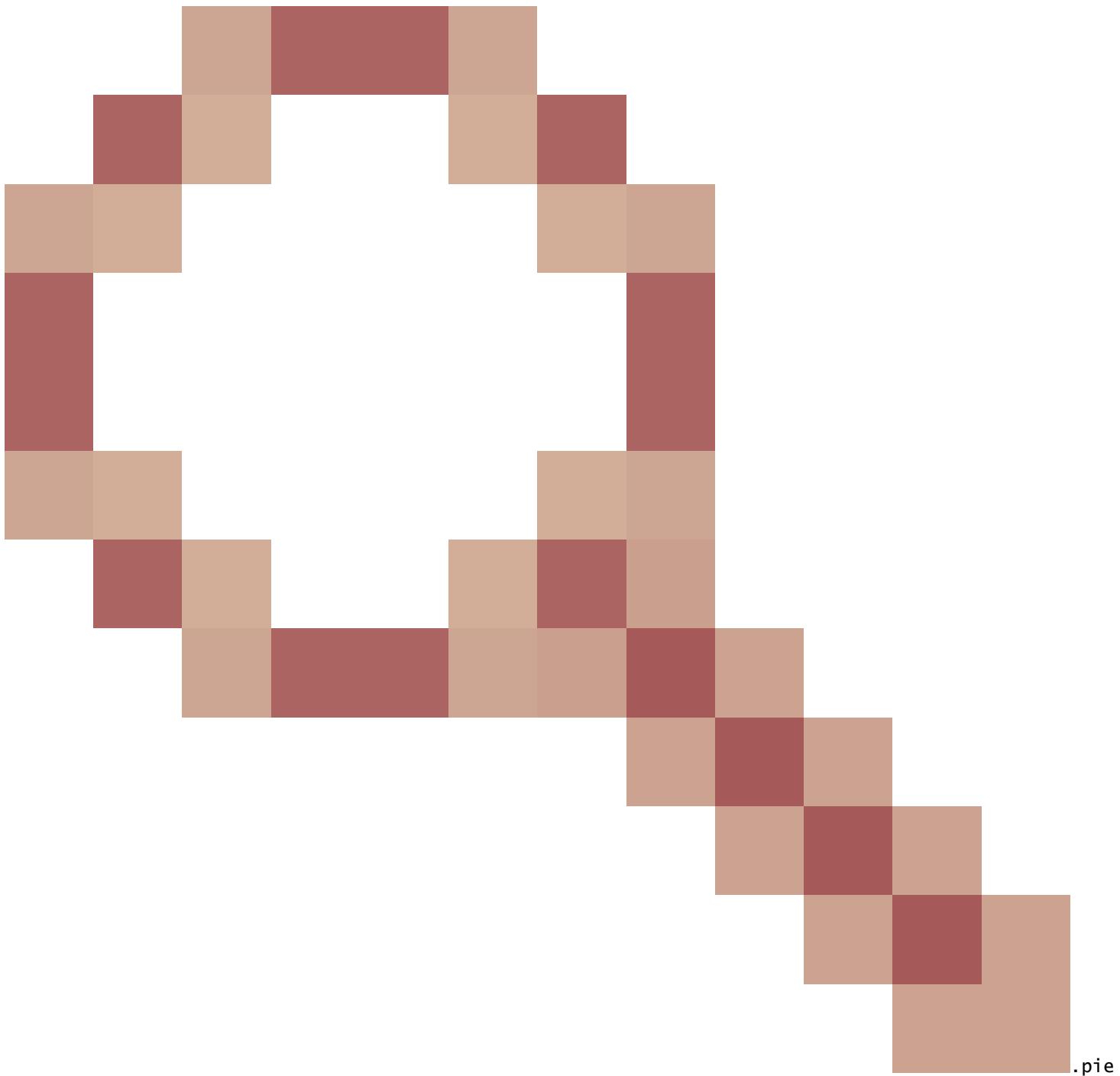
```
Info:
The install operation will continue asynchronously.

Info:     The following packages are now available to be activated:
Info:
Info:       disk0:asr9k-p-4.2.3.CSCub22596-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCub30046-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCub74517-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCub96985-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCuc59492-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCuc84257-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud07536-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud08809-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud19188-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud29892-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud37351-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud39254-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud41972-1.0.0
Info:       disk0:asr9k-p-4.2.3.CSCud54093-1.0.0
```

```
Info:           disk0:asr9k-p-4.2.3.CSCud81064-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud91167-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud98419-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCue21593-1.0.0
Info:
Info:      The packages can be activated across the entire router.
Info:
Install operation 86 completed successfully at 18:03:07 EDT Tue May 14 2013.


RP/0/RSP0/CPU0:ASR9006(admin)#install activate id 86
Tue May 14 18:28:09.078 EDT
Install operation 88 '(admin) install activate id 86' started by user 'root'
           via CLI at 18:28:09 EDT Tue May 14 2013.
Info:      This operation will activate the following packages:
Info:           disk0:asr9k-p-4.2.3.CSCue21593-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud98419-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud91167-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud81064-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud54093-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud41972-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud39254-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud37351-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud29892-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud19188-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud08809-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCud07536-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCuc84257-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCuc59492-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCub96985-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCub74517-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCub30046-1.0.0
Info:           disk0:asr9k-p-4.2.3.CSCub22596-1.0.0
Info:      After this install operation, some SMU package(s) will be superceded.
           User can deactivate and remove superceded SMU(s).
Info:      asr9k-fwding-4.2.3.CSCud39254-1.0.0
Info:      asr9k-fwding-4.2.3.CSCuc84257-1.0.0
Info:      asr9k-fwding-4.2.3.CSCud19188-1.0.0
Info:      asr9k-cpp-4.2.3.CSCud19188-1.0.0
Info:      asr9k-base-4.2.3.CSCud81064-1.0.0
Info:      asr9k-base-4.2.3.CSCud54093-1.0.0
Info:      asr9k-base-4.2.3.CSCud37351-1.0.0
Info:      asr9k-base-4.2.3.CSCuc84257-1.0.0
Info:      asr9k-os-mbi-4.2.3.CSCud37351-1.0.0
Info:      asr9k-os-mbi-4.2.3.CSCuc84257-1.0.0
Info:      After this install operation, some SMU package(s) will be superceded.
           User can deactivate and remove superceded SMU(s).
Info:      asr9k-fwding-4.2.3.CSCud39254-1.0.0
Info:      asr9k-fwding-4.2.3.CSCuc59492-1.0.0
Info:      asr9k-fwding-4.2.3.CSCuc84257-1.0.0
Info:      asr9k-fwding-4.2.3.CSCud19188-1.0.0
Info:      asr9k-cpp-4.2.3.CSCud19188-1.0.0
Info:      iosxr-routing-4.2.3.CSCud08809-1.0.0
Info:      asr9k-base-4.2.3.CSCud81064-1.0.0
Info:      asr9k-base-4.2.3.CSCud54093-1.0.0
Info:      asr9k-base-4.2.3.CSCud37351-1.0.0
Info:      asr9k-base-4.2.3.CSCuc84257-1.0.0
Info:      asr9k-os-mbi-4.2.3.CSCud37351-1.0.0
Info:      asr9k-os-mbi-4.2.3.CSCuc84257-1.0.0
Info:      This operation will reload the following nodes in parallel:
Info:           0/RSP0/CPU0 (RP) (SDR: Owner)
Info:           0/RSP1/CPU0 (RP) (SDR: Owner)
Info:           0/1/CPU0 (LC) (SDR: Owner)
```

```
Info:          0/3/CPU0 (LC) (SDR: Owner)
Proceed with this install operation (y/n)? [y]
Info:     Install Method: Parallel Reload
The install operation will continue asynchronously.

RP/0/RSP0/CPU0:ASR9006(admin)#Info:     The changes made to software
   configurations will not be persistent across system reloads. Use the
   command '(admin) install commit' to make changes persistent.
Info:     Please verify that the system is consistent following the software
          change using the following commands:
Info:          show system verify
Info:          install verify packages
Install operation 88 completed successfully at 18:35:39 EDT Tue May 14 2013.


RP/0/RSP0/CPU0:ASR9006(admin)#install commit
Tue May 14 18:46:24.324 EDT
Install operation 89 '(admin) install commit' started by user 'root' via CLI at
    18:46:24 EDT Tue May 14 2013.
Install operation 89 completed successfully at 18:46:30 EDT Tue May 14 2013.
RP/0/RSP0/CPU0:ASR9006(admin)#
```

Verify Inactive Packages and SMUs

Use the **show install inactive** admin command in order to verify the ability to activate an SMU.

```
RP/0/RSP0/CPU0:ASR9001(admin)#sh install inactive
Wed May  8 05:23:21.062 UTC
Secure Domain Router: Owner

  Node 0/RSP0/CPU0 [RP] [SDR: Owner]
    Boot Device: disk0:
    Inactive Packages:
      disk0:asr9k-mini-px-4.3.0
      disk0:asr9k-p-4.2.1.CSCue28217-1.0.0

  Node 0/0/CPU0 [LC] [SDR: Owner]
    Boot Device: mem:
    Inactive Packages:
      disk0:asr9k-mini-px-4.3.0
      disk0:asr9k-p-4.2.1.CSCue28217-1.0.0
```

Install Activate Operation

After an SMU is successfully added to the system, a message is displayed that the operation is completed successfully and the SMU can be activated on the router. The message displays the name of the package (SMU) that is now available to be activated. It also lists the install operation ID of the add operation that can be used in order to activate all the packages that were added in an install add operation.

```
The install operation will continue asynchronously.
RP/0/RSP0/CPU0:ASR9001(admin)#
Info:     The following package is now available to be activated:
Info:
```

```
Info:          disk0:asr9k-p-4.2.1.CSCue28217-1.0.0
Info:
Info:      The package can be activated across the entire router.
Info:
Install operation 81 completed successfully at 00:44:41 UTC Tue May 07 2013.
```

Example Install Activate Operation - Operation ID

This example uses the install ID of a previous install add operation of a recommended SMU tarball. When you work with recommended SMU tarballs, the install ID of the previous add operation must be used in order to activate all the SMUs in the tarball.

Any SMUs in the tarball that applies to packages that are not currently active are skipped.

```
RP/0/RSP0/CPU0:ASR9001(admin)#install activate id 131
Tue May 14 03:30:12.316 UTC
Install operation 132 '(admin) install activate id 131' started by user 'root'
   via CLI at 03:30:13 UTC Tue May 14 2013.
Info:      This operation will activate the following packages:
Info:          disk0:asr9k-p-4.2.1.CSCud59391-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCud39827-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCud21216-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCud16267-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc95853-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc78780-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc74345-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc62781-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc56676-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc49627-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc47635-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc47238-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc13193-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCuc06881-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub98258-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub96985-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub93663-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub76221-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub74680-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub68512-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub63396-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub48041-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub42561-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub41271-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub29765-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub27892-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub22596-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub16014-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub11591-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCub09558-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua76130-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua74062-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua73510-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua69819-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua58096-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua48549-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua47910-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua37747-1.0.0
```

```
Info:          disk0:asr9k-p-4.2.1.CSCua31485-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua25130-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua16764-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua14945-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCua04907-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCtz82638-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCtz63248-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCtz62914-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCtz24398-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCty99591-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCty84643-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCty83866-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCty18600-1.0.0
Info:          disk0:asr9k-p-4.2.1.CSCtr86240-1.0.0
Info:      The following SMU is not being activated as it does not apply
           to any packages on the router:
Info:
Info:          disk0:iosxr-security-4.2.1.CSCub22596-1.0.0
Info:
Info:      This operation will reload the following nodes in parallel:
Info:          0/RSP0/CPU0 (RP) (SDR: Owner)
Info:          0/0/CPU0 (LC) (SDR: Owner)
Proceed with this install operation (y/n)? [y]
Info:      Install Method: Parallel Reload
The install operation will continue asynchronously.
RP/0/RSP0/CPU0:ASR9001(admin)#
Info:      The changes made to software configurations will not be persistent
           across system reloads. Use the command '(admin) install commit' to make
Info:      changes persistent.
Info:      Please verify that the system is consistent following the
           software change using the following commands:
Info:          show system verify
Info:          install verify packages
Install operation 132 completed successfully at 03:44:21 UTC Tue May 14 2013.
Connection closed by foreign host.
```

Example Install Activate Operation - Package Name

Use the **admin install activate** command with the help option (a question mark) in order to list all the packages (that include SMUs) that can be activated.

In this example, the SMU for Cisco bug ID CSCea12345
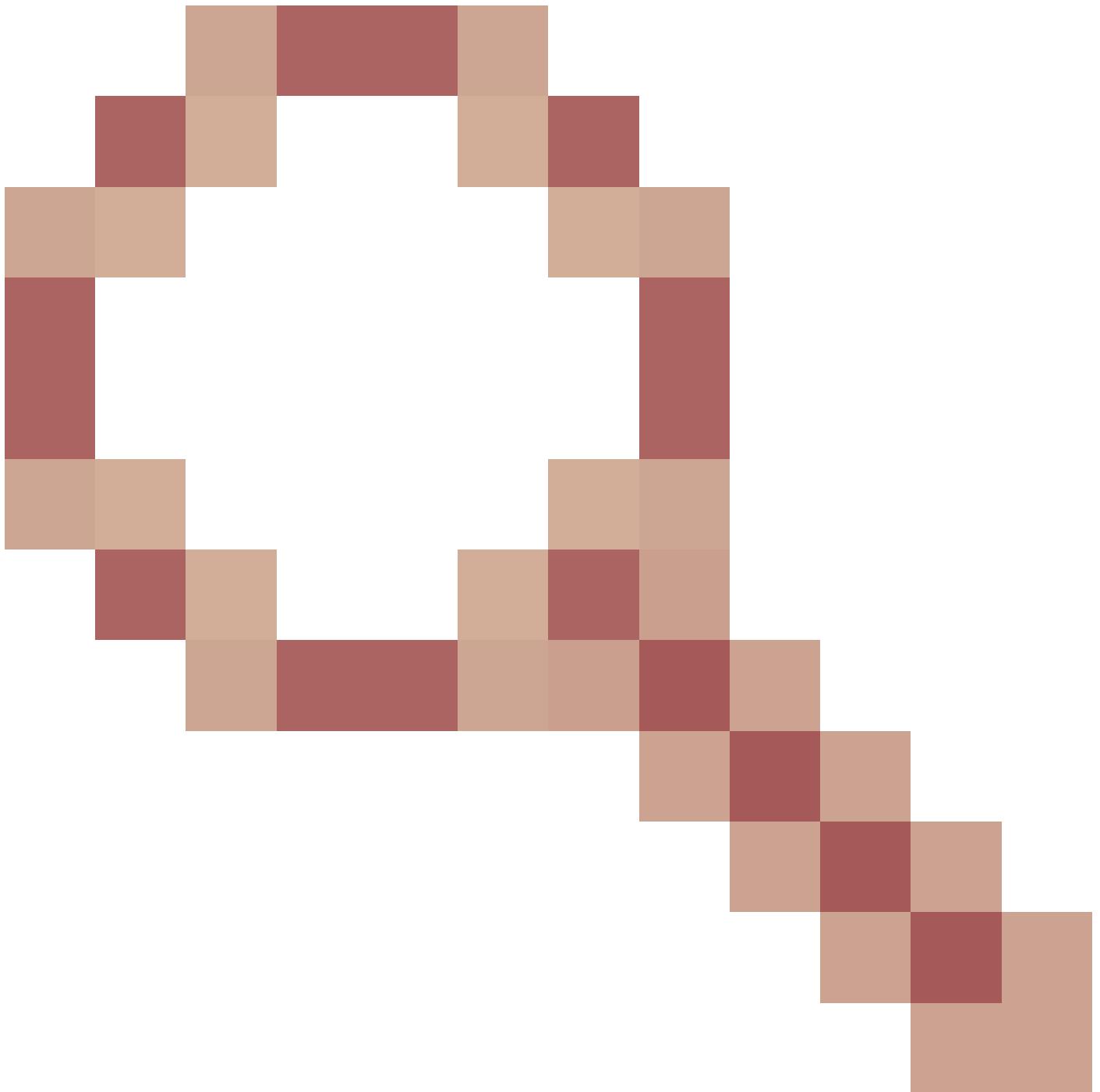
is an SMU that contains the disk0:iosxr-routing-4.0.3.CSCea12345-1.0.0 package. Only the SMU disk0:asr9k-p-4.0.3.CSCea12345-1.0 can be activated; do not activate each individual component package in the SMU.

```
<#root>

RP/0/RSP0/CPU0:A9K-TOP#admin install activate ?

  disk0:asr9k-cpp-4.0.1                    Package to activate
  disk0:asr9k-cpp-4.0.3.CSCtr31747-1.0.0   Package to activate
  disk0:asr9k-k9sec-p-4.0.3                Package to activate
  disk0:asr9k-mini-p-4.0.1                 Package to activate
  disk0:asr9k-mpls-p-4.0.1                 Package to activate


disk0:asr9k-p-4.0.3.CSCea12345-1.0.0      Package to activate
```

```
   disk0:asr9k-p-4.0.3.CSCtr31747-1.0.0       Package to activate
   disk0:iosxr-diags-4.0.1                     Package to activate
   disk0:iosxr-fwding-4.0.3.CSCtr31747-1.0.0   Package to activate


disk0:iosxr-routing-4.0.3.CSCea12345-1.0.0   Package to activate



RP/0/RSP0/CPU0:A9K-TOP#admin install activate
   disk0:asr9k-p-4.0.3.CSCea12345-1.0.0

Install operation 83 '(admin) install activate
   disk0:asr9k-p-4.0.3.CSCea12345-1.0.0'
   started by user 'root' via CLI at 12:14:03 EDT Wed Dec 19 2012.

RP/0/RSP0/CPU0:Dec 19 12:14:03.288 : instdir[206]:
   %INSTALL-INSTMGR-6-INSTALL_OPERATION_STARTED : Install operation 83 '

(admin) install activate disk0:asr9k-p-4.0.3.CSCea12345-1.0.0' started by user
   'root' 12:14:03 EDT Wed Dec 19 2012.

Info:     Install Method: Parallel Process Restart

The install operation will continue asynchronously.

LC/0/0/CPU0:Dec 19 12:14:38.365 : sysmgr[87]: %OS-SYSMGR-7-INSTALL_NOTIFICATION :
   notification of software installation received
LC/0/3/CPU0:Dec 19 12:14:38.370 : sysmgr[87]: %OS-SYSMGR-7-INSTALL_NOTIFICATION :
   notification of software installation received
LC/0/0/CPU0:Dec 19 12:14:38.381 : sysmgr[87]: %OS-SYSMGR-7-INSTALL_FINISHED :
   software installation is finished
LC/0/3/CPU0:Dec 19 12:14:38.385 : sysmgr[87]: %OS-SYSMGR-7-INSTALL_FINISHED :
   software installation is finished
LC/0/6/CPU0:Dec 19 12:14:38.529 : sysmgr[90]: %OS-SYSMGR-7-INSTALL_NOTIFICATION :
   notification of software installation received
LC/0/6/CPU0:Dec 19 12:14:38.546 : sysmgr[90]: %OS-SYSMGR-7-INSTALL_FINISHED :
   software installation is finished
RP/0/RSP0/CPU0:Dec 19 12:14:53.145 : sysmgr[95]: %OS-SYSMGR-7-INSTALL_NOTIFICATION :
   notification of software installation received
RP/0/RSP0/CPU0:Dec 19 12:14:53.184 : sysmgr[95]: %OS-SYSMGR-7-INSTALL_FINISHED :
   software installation is finished

Info:     The changes made to software configurations will not be persistent
          across system reloads. Use the command

Info:     '(admin) install commit' to make changes persistent.

Info:     Please verify that the system is consistent following the software
          change using the following commands:

Info:         show system verify

Info:         install verify packages

RP/0/RSP0/CPU0:Dec 19 12:15:04.165 : instdir[206]:
   %INSTALL-INSTMGR-4-ACTIVE_SOFTWARE_COMMITTED_INFO : The currently active
   software is not committed. If the system reboots then the committed software
   will be used. Use 'install commit' to commit the active software.

RP/0/RSP0/CPU0:Dec 19 12:15:04.166 : instdir[206]:
   %INSTALL-INSTMGR-6-INSTALL_OPERATION_COMPLETED_SUCCESSFULLY : Install
```

```
    operation 83 completed successfully

Install operation 83 completed successfully at 12:15:04 EDT Wed Dec 19 2012.
```

Example Install Activate Operation - Multiple SMUs with Package Names

You can list each SMU serially in the command line if you want to activate more than one SMU in one operation.

```
<#root>

RP/0/RSP0/CPU0:A9K-TOP#admin install activate ?

  disk0:asr9k-cpp-4.0.1                      Package to activate
  disk0:asr9k-cpp-4.0.3.CSCtr31747-1.0.0     Package to activate
  disk0:asr9k-k9sec-p-4.0.3                  Package to activate
  disk0:asr9k-mini-p-4.0.1                   Package to activate
  disk0:asr9k-mpls-p-4.0.1                   Package to activate


disk0:asr9k-p-4.0.3.CSCea12345-1.0.0       Package to activate



disk0:asr9k-p-4.0.3.CSCtr31747-1.0.0


Package to activate


  disk0:iosxr-diags-4.0.1                    Package to activate
  disk0:iosxr-fwding-4.0.3.CSCtr31747-1.0.0  Package to activate
  disk0:iosxr-routing-4.0.3.CSCea12345-1.0.0 Package to activate



RP/0/RSP0/CPU0:A9K-TOP#admin install activate
   disk0:asr9k-p-4.0.3.CSCea12345-1.0.0
   disk0:asr9k-p-4.0.3.CSCtr31747-1.0.0
```

Example Install Activate Operation - ISSU SMU with Prompted Option

```
RP/0/RSP0/CPU0:ASR9006(admin)#install activate
   disk0:asr9k-px-4.2.3.CSCug30234-1.0.0 prompt-level all issu
Fri Jul 26 09:16:24.538 EST
Install operation 68 '(admin) install activate
   disk0:asr9k-px-4.2.3.CSCug30234-1.0.0
   prompt-level all issu' started by user 'root' via CLI
at 09:16:24 EST Fri Jul 26 2013.
Info:     The issu option has been specified for install operation 68.
Info:     After this install operation, some SMU package(s) will be superceded.
          User can deactivate and remove superceded SMU(s).
Info:     asr9k-fwding-4.2.3.CSCuf32158-1.0.0
```

```
Info:      asr9k-fwding-4.2.3.CSCud65815-1.0.0
Info:      asr9k-fwding-4.2.3.CSCud37351-1.0.0
Info:      asr9k-base-4.2.3.CSCue45839-1.0.0
Info:      asr9k-base-4.2.3.CSCud98419-1.0.0
Info:      asr9k-base-4.2.3.CSCud60032-1.0.0
Info:      asr9k-base-4.2.3.CSCud54093-1.0.0
Info:      asr9k-base-4.2.3.CSCud37351-1.0.0
Info:      asr9k-os-mbi-4.2.3.CSCue45839-1.0.0
Info:      asr9k-os-mbi-4.2.3.CSCud54093-1.0.0
Info:      asr9k-os-mbi-4.2.3.CSCud37351-1.0.0
Info:      Install Method: In-service Upgrade
Info:      The activation will continue in three phases, minimizing packet loss:
Info:         load    - confirms the viability of the activation, and prepares
                          any nodes for the activation.
Info:                  - reload the following node:
Info:                     0/RSP1/CPU0
Info:         run     - causes the new software to be run on the active nodes
                           for the first time.
Info:                  - switchover performed from:
Info:                       0/RSP0/CPU0 to 0/RSP1/CPU0
Info:                  - warm-reload the following nodes:
Info:                        0/0/CPU0
Info:                        0/1/CPU0
Info:                        0/2/CPU0
Info:         complete - completes the operation.
Info:      The three phases can be performed consecutively without user input
              (unprompted), or there can be a pause after each phase until the
Info:      user has specified that the next phase can be performed (prompted).
How do you want the operation to continue (unprompted/prompted/abort)?:
   [prompted]
Install operation 68: load phase started at 09:16:59 EST Fri Jul 26 2013.
The install operation will continue asynchronously, prompting after each phase.
Info:      The activation has now occurred on the following node:
Info:         0/RSP1/CPU0
Info:      The activation has completed the load phase.
Info:      To continue with the next phase of the operation use:
Info:         (admin) install operation 68 run
Install operation 68: load phase completed at 09:25:55 EST Fri Jul 26 2013.

RP/0/RSP0/CPU0:ASR9006(admin)#install operation 68 run
Fri Jul 26 09:31:34.743 EST
RP/0/RSP0/CPU0:ASR9006(admin)#Install operation 68: run phase started at
   09:31:36 EST Fri Jul 26 2013.
Connection closed by foreign host.
```

Install Commit Operation

To make an SMU activation persistent across reloads, you must commit the change with the **install commit** admin command.

Example Install Commit Operation

```
RP/0/RSP0/CPU0:ASR9001(admin)#sh install active summary
Tue May 14 04:07:53.898 UTC
Default Profile:
  SDRs:
    Owner
```

```
  Active Packages:
    disk0:asr9k-p-4.2.1.CSCuc47238-1.0.0
    disk0:asr9k-p-4.2.1.CSCud39827-1.0.0
    disk0:asr9k-p-4.2.1.CSCud21216-1.0.0
    disk0:asr9k-p-4.2.1.CSCud16267-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc78780-1.0.0
    disk0:asr9k-p-4.2.1.CSCua16764-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc62781-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc56676-1.0.0
    disk0:asr9k-p-4.2.1.CSCua04907-1.0.0
    disk0:asr9k-p-4.2.1.CSCub42561-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc13193-1.0.0
    disk0:asr9k-p-4.2.1.CSCty84643-1.0.0
    disk0:asr9k-p-4.2.1.CSCty83866-1.0.0
    disk0:asr9k-p-4.2.1.CSCub93663-1.0.0
    disk0:asr9k-p-4.2.1.CSCub74680-1.0.0
    disk0:asr9k-p-4.2.1.CSCua76130-1.0.0
    disk0:asr9k-p-4.2.1.CSCua74062-1.0.0
    disk0:asr9k-p-4.2.1.CSCua73510-1.0.0
    disk0:asr9k-p-4.2.1.CSCua47910-1.0.0
    disk0:asr9k-mini-p-4.2.1
    disk0:asr9k-mgbl-p-4.2.1
    disk0:asr9k-p-4.2.1.CSCuc74345-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc49627-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc47635-1.0.0
    disk0:asr9k-p-4.2.1.CSCua31485-1.0.0
    disk0:asr9k-p-4.2.1.CSCub11591-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz62914-1.0.0
    disk0:asr9k-p-4.2.1.CSCua48549-1.0.0
    disk0:asr9k-p-4.2.1.CSCua69819-1.0.0
    disk0:asr9k-p-4.2.1.CSCua14945-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz63248-1.0.0
    disk0:asr9k-p-4.2.1.CSCub48041-1.0.0
    disk0:asr9k-p-4.2.1.CSCub27892-1.0.0
    disk0:asr9k-p-4.2.1.CSCub16014-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc06881-1.0.0
    disk0:asr9k-p-4.2.1.CSCub98258-1.0.0
    disk0:asr9k-p-4.2.1.CSCty99591-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz24398-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz82638-1.0.0
    disk0:asr9k-p-4.2.1.CSCty18600-1.0.0
    disk0:asr9k-p-4.2.1.CSCtr86240-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc95853-1.0.0
    disk0:asr9k-p-4.2.1.CSCub96985-1.0.0
    disk0:asr9k-p-4.2.1.CSCub68512-1.0.0
    disk0:asr9k-p-4.2.1.CSCub09558-1.0.0
    disk0:asr9k-p-4.2.1.CSCua58096-1.0.0
    disk0:asr9k-p-4.2.1.CSCua37747-1.0.0
    disk0:asr9k-p-4.2.1.CSCua25130-1.0.0
    disk0:asr9k-p-4.2.1.CSCub29765-1.0.0
    disk0:asr9k-fpd-p-4.2.1
    disk0:asr9k-p-4.2.1.CSCub76221-1.0.0
    disk0:asr9k-p-4.2.1.CSCub41271-1.0.0
    disk0:asr9k-p-4.2.1.CSCub63396-1.0.0
    disk0:asr9k-p-4.2.1.CSCud59391-1.0.0

RP/0/RSP0/CPU0:ASR9001(admin)#sh install commit summary
Tue May 14 04:08:07.151 UTC
Default Profile:
  SDRs:
    Owner
  Committed Packages:
```

```
    disk0:asr9k-mini-p-4.2.1
    disk0:asr9k-mgbl-p-4.2.1
    disk0:asr9k-fpd-p-4.2.1


RP/0/RSP0/CPU0:ASR9001(admin)#install commit
Tue May 14 04:08:17.150 UTC
Install operation 133 '(admin) install commit' started by user 'root'
    via CLI at 04:08:17 UTC Tue May 14 2013.
Install operation 133 completed successfully at 04:08:24 UTC Tue May 14 2013.


RP/0/RSP0/CPU0:ASR9001-B(admin)#sh install commit summ
Tue May 14 04:10:25.049 UTC
Default Profile:
  SDRs:
    Owner
  Committed Packages:
    disk0:asr9k-p-4.2.1.CSCuc47238-1.0.0
    disk0:asr9k-p-4.2.1.CSCud39827-1.0.0
    disk0:asr9k-p-4.2.1.CSCud21216-1.0.0
    disk0:asr9k-p-4.2.1.CSCud16267-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc78780-1.0.0
    disk0:asr9k-p-4.2.1.CSCua16764-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc62781-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc56676-1.0.0
    disk0:asr9k-p-4.2.1.CSCua04907-1.0.0
    disk0:asr9k-p-4.2.1.CSCub42561-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc13193-1.0.0
    disk0:asr9k-p-4.2.1.CSCty84643-1.0.0
    disk0:asr9k-p-4.2.1.CSCty83866-1.0.0
    disk0:asr9k-p-4.2.1.CSCub93663-1.0.0
    disk0:asr9k-p-4.2.1.CSCub74680-1.0.0
    disk0:asr9k-p-4.2.1.CSCua76130-1.0.0
    disk0:asr9k-p-4.2.1.CSCua74062-1.0.0
    disk0:asr9k-p-4.2.1.CSCua73510-1.0.0
    disk0:asr9k-p-4.2.1.CSCua47910-1.0.0
    disk0:asr9k-mini-p-4.2.1
    disk0:asr9k-mgbl-p-4.2.1
    disk0:asr9k-p-4.2.1.CSCuc74345-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc49627-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc47635-1.0.0
    disk0:asr9k-p-4.2.1.CSCua31485-1.0.0
    disk0:asr9k-p-4.2.1.CSCub11591-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz62914-1.0.0
    disk0:asr9k-p-4.2.1.CSCua48549-1.0.0
    disk0:asr9k-p-4.2.1.CSCua69819-1.0.0
    disk0:asr9k-p-4.2.1.CSCua14945-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz63248-1.0.0
    disk0:asr9k-p-4.2.1.CSCub48041-1.0.0
    disk0:asr9k-p-4.2.1.CSCub27892-1.0.0
    disk0:asr9k-p-4.2.1.CSCub16014-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc06881-1.0.0
    disk0:asr9k-p-4.2.1.CSCub98258-1.0.0
    disk0:asr9k-p-4.2.1.CSCty99591-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz24398-1.0.0
    disk0:asr9k-p-4.2.1.CSCtz82638-1.0.0
    disk0:asr9k-p-4.2.1.CSCty18600-1.0.0
    disk0:asr9k-p-4.2.1.CSCtr86240-1.0.0
    disk0:asr9k-p-4.2.1.CSCuc95853-1.0.0
    disk0:asr9k-p-4.2.1.CSCub96985-1.0.0
    disk0:asr9k-p-4.2.1.CSCub68512-1.0.0
    disk0:asr9k-p-4.2.1.CSCub09558-1.0.0
    disk0:asr9k-p-4.2.1.CSCua58096-1.0.0
```

```
disk0:asr9k-p-4.2.1.CSCua37747-1.0.0
disk0:asr9k-p-4.2.1.CSCua25130-1.0.0
disk0:asr9k-p-4.2.1.CSCub29765-1.0.0
disk0:asr9k-fpd-p-4.2.1
disk0:asr9k-p-4.2.1.CSCub76221-1.0.0
disk0:asr9k-p-4.2.1.CSCub41271-1.0.0
disk0:asr9k-p-4.2.1.CSCub63396-1.0.0
disk0:asr9k-p-4.2.1.CSCud59391-1.0.0
```

Error Messages

Bootflash is Beyond 80% Utilization

This message can appear after SMU installation.

```
RP/0/RSP0/CPU0:Jul  9 17:40:37.959 : wdsysmon[447]: %HA-HA_WD-4-DISK_WARN : A monitored device /bootfla
```

This message can be safely ignored.

As per the design, it is expected that Cisco IOS XR keeps up to two MBIs on the boot flash that comes after the SMU install(s). At subsequent SMU install(s), if the bootflash space required by the new package(s) is not available, Cisco IOS XR cleans up automatically old MBIs to make space for the new MBI package.