TeKENUM

Installation & Configuration Guide
Version 1.5

Document Revision 2.3

https://www.kaplansoft.com/

TekENUM is built by Yasin KAPLAN

Read "Readme.txt" for last minute changes and updates which can be found under application directory.

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Introduction

TekENUM is a Proxy DNS / ENUM Server *(Based on RFC 3761)* runs under Windows *(Vista/7/8/10/11, 2008-2022 Server)*.

TekENUM can act as a proxy for undefined ENUM endpoints as well as other DNS query types such as A *(Address records)*. TekENUM supports UDP, TCP, TLS *(DoT)* and DNS over HTTPS *(DoH)* transports. TekENUM can provide transport interworking when used as a DNS proxy. You can specify source-destination based DNS access policies.

System Requirements

- A Windows system with at least 4 GB of RAM.
- Microsoft.NET Framework v4.8 *(Min.)*
- 10 MB of disk space for installation.
- Administrative privileges.

Installation

Unzip “TekENUM.zip” and click “Setup.exe” comes with the distribution. Follow the instructions of setup wizard. Setup will install TekENUM Manager and TekENUM Service, add a shortcut for TekENUM Manager to desktop and the start menu.

Configuration

Run TekENUM Manager from Start Menu / Program Files / TekENUM. TekENUM automatically configures itself at first run.

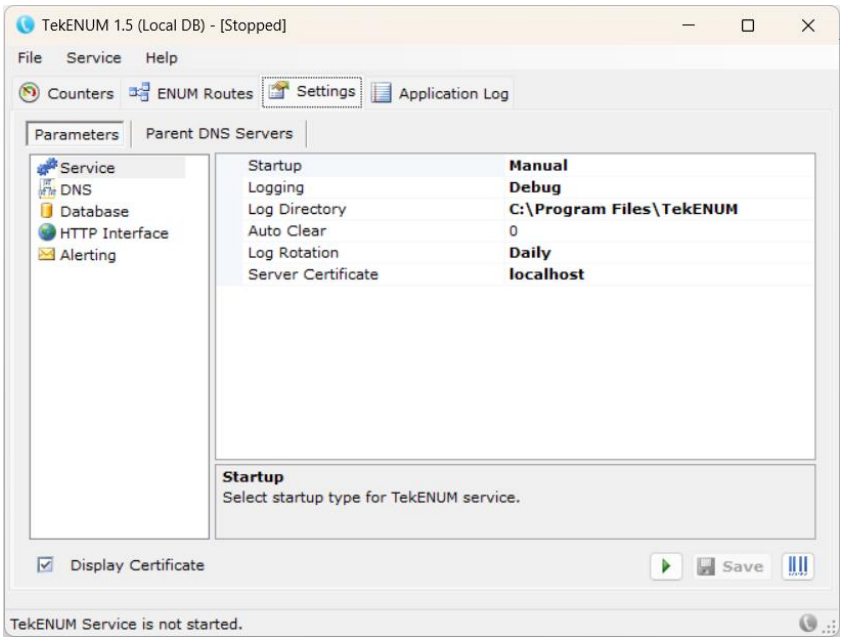


Figure - 1. TekENUM Settings tab *(Service)*

Settings Tab

Click the Settings Tab to start configuration. The Settings tab has two sub sections. Parameters sub section has Service, DNS, Database HTTP Interface and Alerting settings.

Service

- **Startup:** Set TekENUM service startup mode, Manual or Automatic. You can also disable service startup.
- **Logging:** Select logging level of TekENUM. Select "None" if you do not want logging, select "Errors" to log errors and select "Sessions" to log session information and errors. Log files are located under <Application Directory>\Logs directory.
- **Log Directory:** You can specify where to keep log files. Default location is under C:\Program Files\TekENUM. TekENUM will create a Log sub folder to keep log files.
- **Auto Clear:** When its value is set to a value other than 0, TekENUM will clear log files older than specified days automatically.
- **Log Rotation:** TekENUM rotates log files daily by default. You can also have the hourly rotation option.
- **Server Certificate:** Select a certificate to be used with HTTP Interface and TLS transport. Certificates must be placed on Windows Certificate Store / Local Machine / Personal folder and created for Server Authentication.

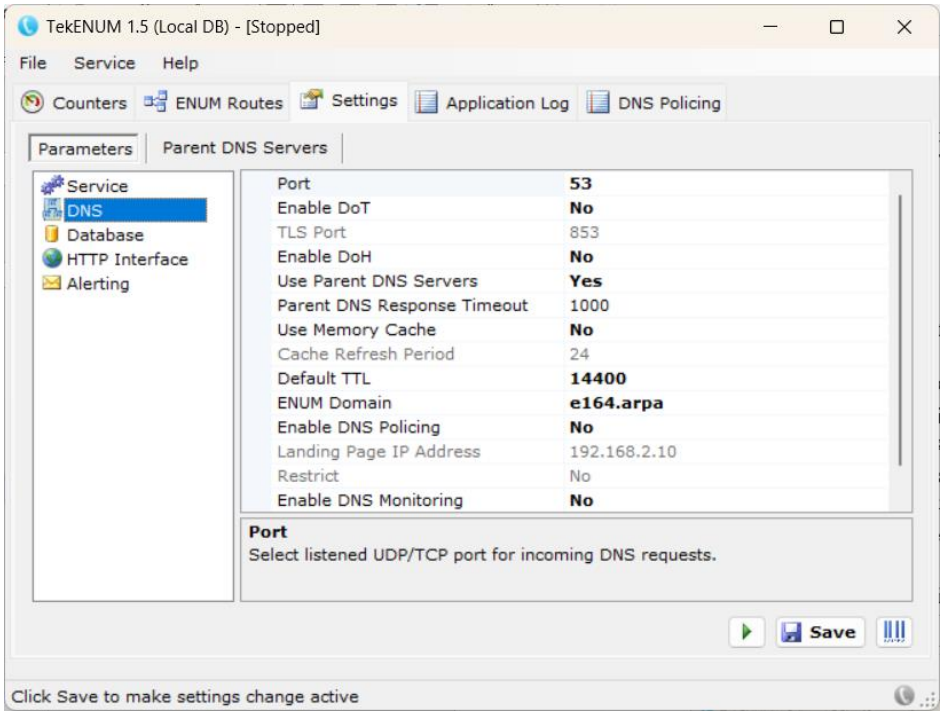
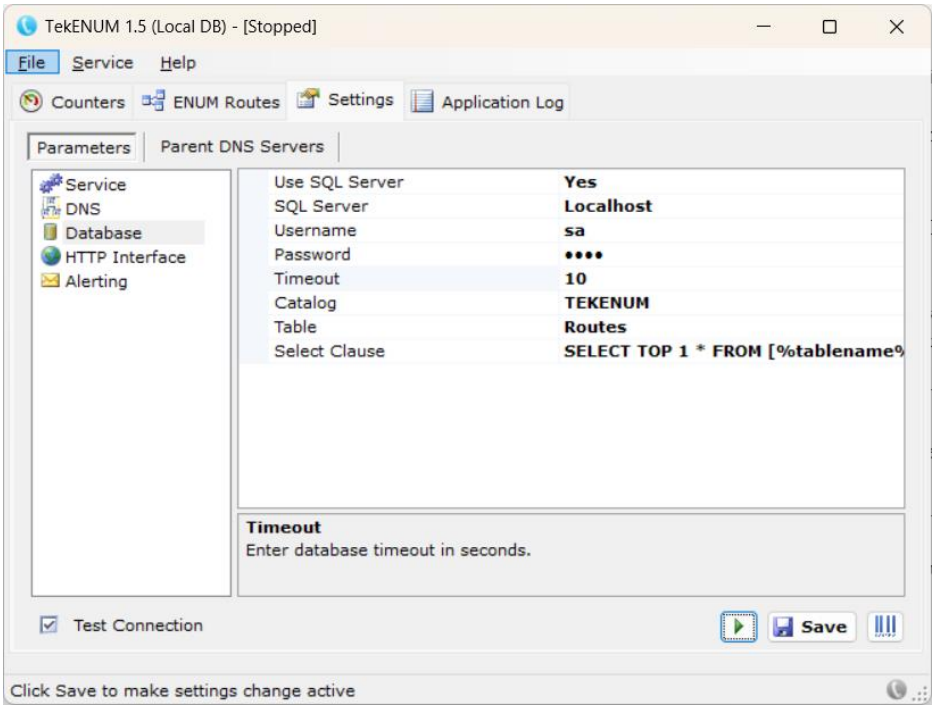


Figure - 2. TekENUM Settings tab *(DNS)*

DNS

- **Port:** You can define a port number to be listened *(Default 53)*. This port is used with both UDP and TCP transports. TekENUM will listen on all available IP interfaces when started.

- **Enable DoT:** This option enables TLS transport. Please make sure that you have a proper certificate selected in Service parameters prior to enabling TLS transport.
- **TLS Port:** Set TCP port for the TLS transport *(Default 853)*.
- **Enable DoH:** This option enables DNS over HTTPS transport. You must enable HTTP Interface with TLS option and please make sure that you have a proper certificate selected in Service parameters prior to enabling DoH transport.
- **Use Parent DNS Servers:** This option enables proxy mode of TekENUM. TekENUM will respond to PTR type queries for phone numbers when this option is not enabled. When this option is enabled TekENUM will consult DNS servers specified in the TCP/IP settings of the operating system or user specified DNS server in the Settings / Parent DNS Servers sub tab.
- **Parent DNS Response Timeout:** Specify response timeout for the parent DNS servers in milliseconds.
- **Use Memory Cache:** This feature is available with a commercial license. You can keep query result in memory to provide faster responses to subsequent queries. Requires a commercial license.
- **Memory Cache Refresh Period:** TekENUM will clear memory cache in periods specified in this parameter.
- **ENUM Domain:** Set default ENUM domain to be received in ENUM queries. The default is e164.arpa.



- **Figure - 3.** TekENUM Settings tab *(Database)*

- **Enable DNS Policing:** DNS policy allows you to specify source and destination-based DNS access policies. Please DNS Policing section for more information.
- **Landing Page IP Address:** Enter the IP address of the web server which hosts an informative page displayed for the redirected DNS queries. TekENUM will return this IP address as an A record for the denied DNS requests.

- **Restricts:** TekENUM does not allow proxy DNS requests for the unknown source IP addresses when this option is enabled.
- **Enable DNS Monitoring:** TekENUM accepts DNS queries only destined to the IP addresses specified on the host machine. You can force TekENUM to respond DNS queries received in a mirrored traffic stream by enabling this option. Requires a commercial license and is available when TekENUM installed on to a Windows server.

Database

TekENUM uses a built-in database by default. If you plan to use a Microsoft SQL Server database, create database and “Routes” table using TekENUM.sql and Routes.sql scripts respectively. These scripts can be found in the TekENUM application directory

- **Use SQL Server:** TekENUM uses its internal database to keep records for ENUM routing by default.
- **SQL Server:** Select the SQL server to be connected. TekENUM will discover and populate a server list when the SQL Server option is enabled.
- **Username:** Set the username for the SQL server connection.
- **Password:** Set the password for the SQL server connection.
- **Timeout:** Set the timeout value in seconds for the SQL server connection.
- **Catalog:** Select the database in the SQL server. TekENUM will list available databases on the selected SQL server.
- **Table:** Select the table in the SQL server database to store routing records. TekENUM will list available tables on the selected SQL server database. Selected table must have required fields.
- **Select Clause:** Specify an SQL server query to fetch records matching the ENUM query.

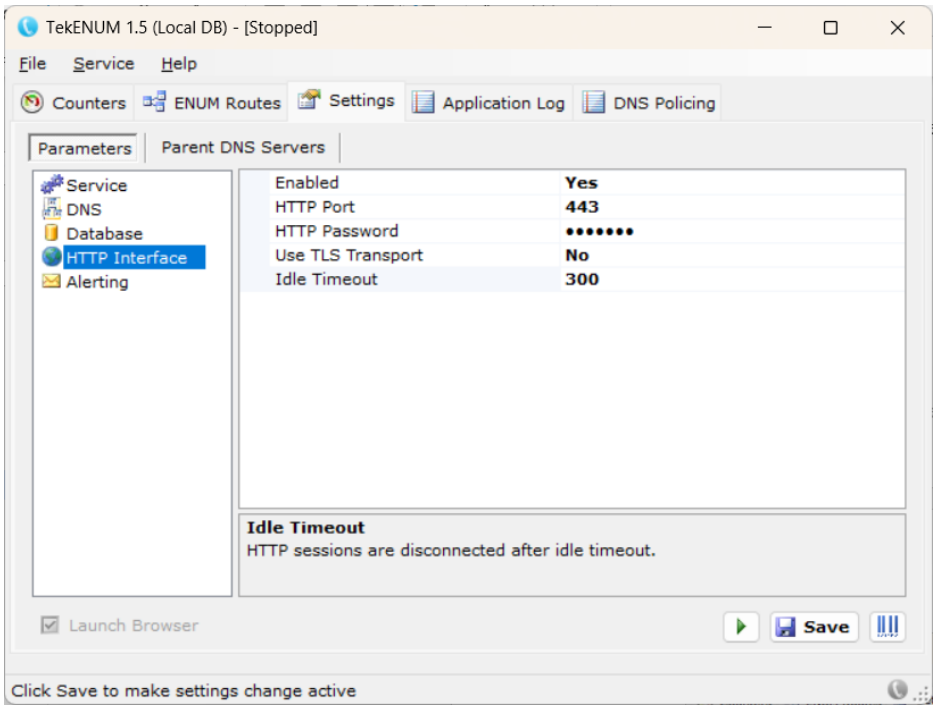


Figure - 4. TekENUM Settings tab *(HTTP Interface)*

TekENUM will replace `%prefix%` variable with queried E.164 address. TekENUM invokes stored procedure `getroute` in this sample. If you use a view or a stored procedure, returned record structure must be in following format;

```
CREATE TABLE [dbo].[Routes](
      [Prefix] [nvarchar](255) NOT NULL,
      [Order] [int] NULL CONSTRAINT [DF_Routes_Order]  DEFAULT ((100)),
      [Preference] [int] NULL CONSTRAINT [DF_Routes_Preference]  DEFAULT ((10)),
      [RegEx] [nvarchar](255) NULL CONSTRAINT [DF_Routes_RegEx]  DEFAULT ('^.*$'),
      [URI] [nvarchar](255) NULL,
      [Flag] [char](1) NULL,
      [TXT] [nvarchar](255) NULL
) ON [PRIMARY]
```

Default select clause is;

```
SELECT TOP 1 * FROM [Routes] (NOLOCK) WHERE [Prefix]='%prefix%' order by
[Prefix] asc
```

HTTP Interface

- **Enabled:** This option enables the HTTP Interface. HTTP interface provides the same functionality with the TekENUM Manager.
- **HTTP Port:** Select a TCP port for the built-in HTTP server *(Default 80 and 443 when TLS transport is enabled)*.
- **HTTP Password:** Set a password to connect to the HTTP interface *(TekENUM by default, case sensitive)*.
- **Use TLS Transport:** Enable TLS transport. A proper server certificate must be set in the Service Parameters section. This is also required for the incoming DNS request through the DoH transport.
- **Idle Timeout:** Set an idle timeout in seconds. TekENUM will disconnect to connection to the HTTP interface after the timeout reaches.

Alerting

TekENUM can be configured to send e-mail alerts if an error condition occurs for a specified duration.[1]

Enter the following information to configure alerting:

- **Mail Alerting Enabled.** Check this option to enable the Mail Alerting feature.
- **SMTP Server.** Enter the IP address or FQDN of the SMTP server.
- **Mail To.** Enter the e-mail address to which alerts are to be sent.
- **Mail From. E**nter the e-mail address that will be shown as the sender email address.
- **Authentication Required.** Check this option if the SMTP server requires user authentication.
- **SMTP Username.** If 'Authentication Required' has been checked, enter the SMTP username.

[1] Please set SMTP port as 587, go to https://myaccount.google.com/lesssecureapps and set Allow less secure apps: ON if you prefer to use a Gmail account.

- **Password.** If 'Authentication Required' has been checked, enter the password of the SMTP user.
- **Error Duration**. Enter the minimum error duration *(in seconds)* before sending an e-mail alert *(Default: 60 seconds)*.
- **Mail Period.** Enter the minimum duration *(in minutes)* before sending the next e-mail alert *(Default: 15 minutes)*.

Click **Test Alerting** to test the E-Mail Alerting configuration. If the configuration is valid, a test message will be sent by TekENUM to the 'Mail To' email address.

TekENUM will send notifications via e-mail when system errors *(Such as database connection failures)*, startup and shutdown events occur for a specified duration. TekENUM also sends a warning message when a user account is locked due to number of failed authentications attempts if **Settings / Service Parameters / Failure Count** value is set to a value greater than zero.

Parent DNS Servers

TekENUM uses DNS servers as parent DNS servers configured in system TCP/IP settings when DNS proxy is enabled. You can also specify your own parent DNS servers.

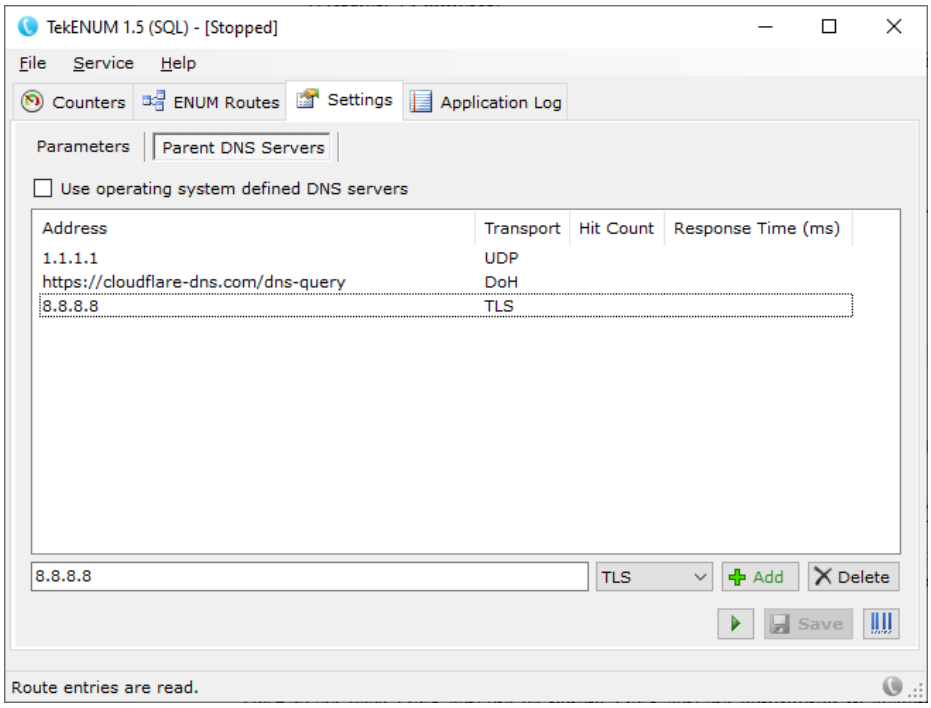


Figure - 5. Parent DNS Servers Tab

You can change the order of the DNS servers by dragging. This feature requires a commercial license.

DNS Policing

You can create DNS policies to control DNS queries proxied through TekENUM. You need to create black- or whitelist-based profiles. Every profile must have destination domain names and matching source IP addresses or subnets. TekENUM can also check resolved IP addresses for an A

(Address) type DNS query so you can specify both IP addresses and domain names in the Destinations section.

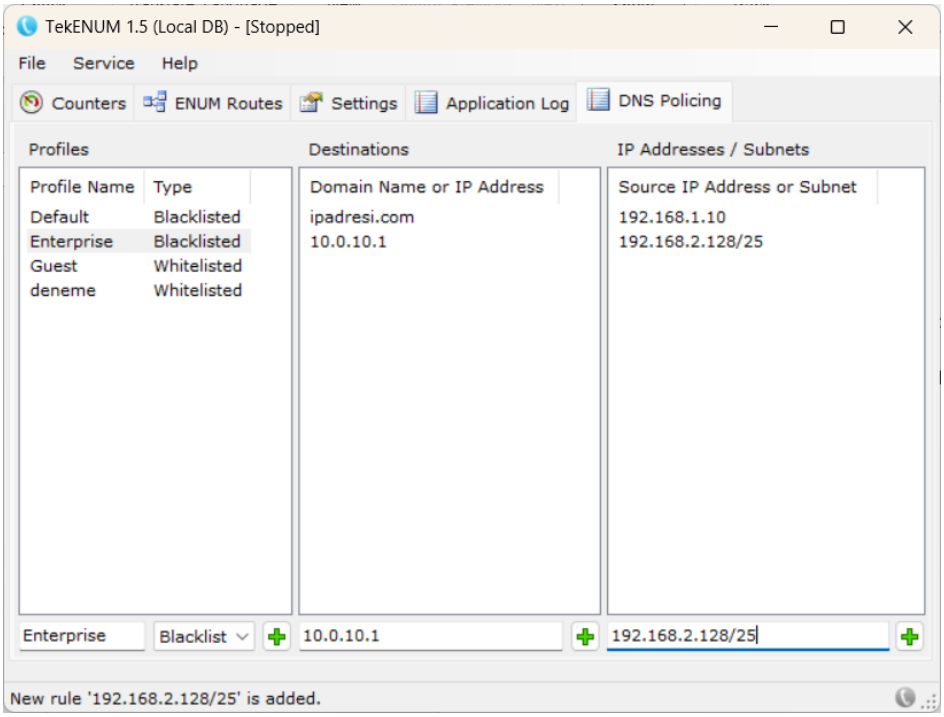


Figure - 6. DNS Policing Tab

You can add 0.0.0.0 as IP address to the IP Addresses / Subnets section to match all source IP addresses.

TekENUM will return landing page IP address to blocked DNS A type queries. TekENUM will respond to all DNS queries received in redirected DNS quires to TekENUM server either via mirroring or policy-based routing when you enable DNS Monitoring options in Settings.

Routing

You can define resource records or routes for a particular E.164 number or a prefix in “Routing” tab. Enter a phone number prefix to bottom leftmost textbox and click “Add Route” button.

You can also have a default route entry. TekENUM chooses the longest match prefix route. If any match cannot be found the default route is chosen if exists. You can have just one resource record per prefix or per E.164 entry.

Enter a prefix and click “Add Route” button to add a new routing entry. You must edit at least URI entry to commit changes.

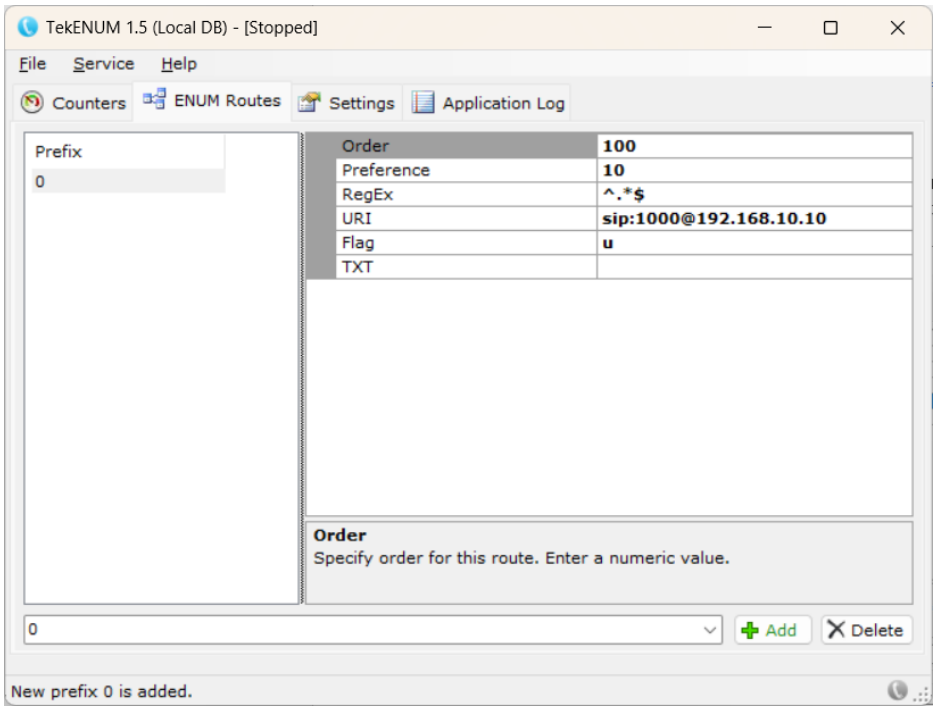


Figure – 7. Routing Tab

Application Log

You can monitor system events in the Application Log tab. You can manually refresh log entries and clear log entries. Click Enable Auto Refresh option to refresh log list every second.

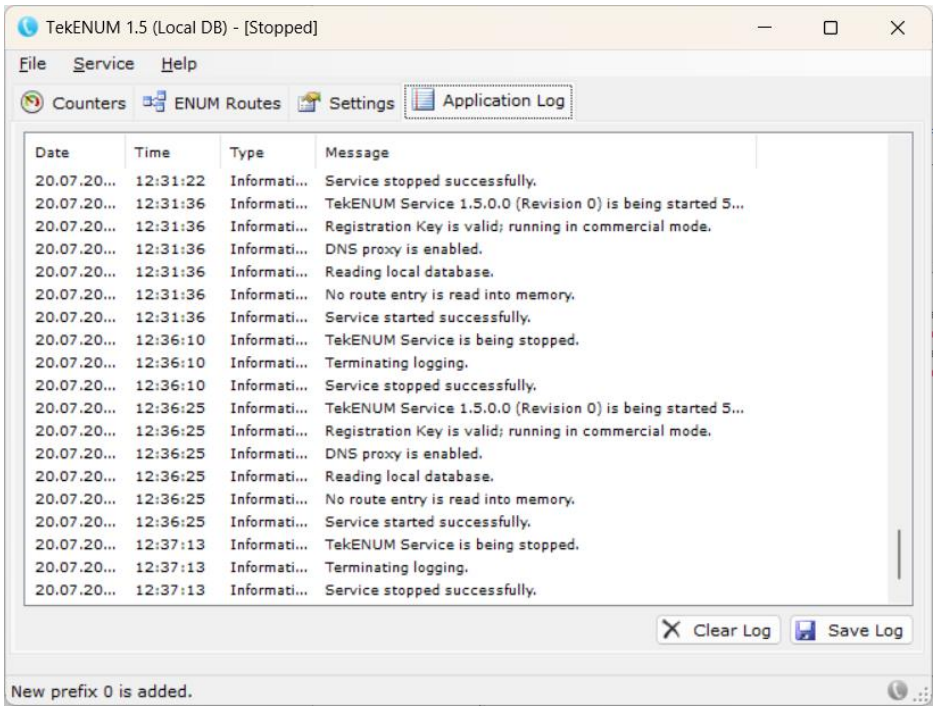


Figure - 8. Application Log Tab

Starting TekENUM

Click “Service” menu and select “Start” to run TekENUM after making necessary configuration and saving configuration. If service starts successfully you will see “TekENUM Service is started” message at bottom left message section of TekENUM Manager. Optionally you can start/stop TekENUM using the button on the Settings tab. When you make any change(s) in configuration, TekENUM will ask you if you wish to restart TekENUM to make settings changes active if TekENUM service is running.

If TekENUM service cannot start, please examine Application Log tab as well as TekENUM log file under <Application Directory>\Logs if you were enabled logging in Settings tab.

HTTP Interface

HTTP Interface can be used to configure and manage TekENUM service remotely. TekENUM allows https connections when TLS transport is enabled for the HTTP interface and a valid certificate is set at Settings / Parameters / Service.

Troubleshooting

TekENUM provides many messages when problems occur. You can see error messages on TekENUM Status bar or in the log file of TekENUM service. You can enable logging in to the Settings Tab. There are three levels of logging: None, Errors, Sessions. If you select Errors TekENUM logs just error messages. If you select Sessions both Session and Error messages will be logged. You must save or apply settings changes if you change logging level setting. Log files are located under <Application Directory>\Logs directory.

TekENUM also utilizes Windows Performance Monitor providing numerous counters;

- Used Memory
- Number of Items in Memory Cache
- Number of DNS Requests Received
- Number of ENUM Requests Received
- DNS Requests Receive Rate
- ENUM Requests Receive Rate
- Number of DNS Requests Forwarded
- Number of ENUM Requests Forwarded
- Number of Successful Queries
- Number of Replies from Memory Cache
- Number of Failed Queries

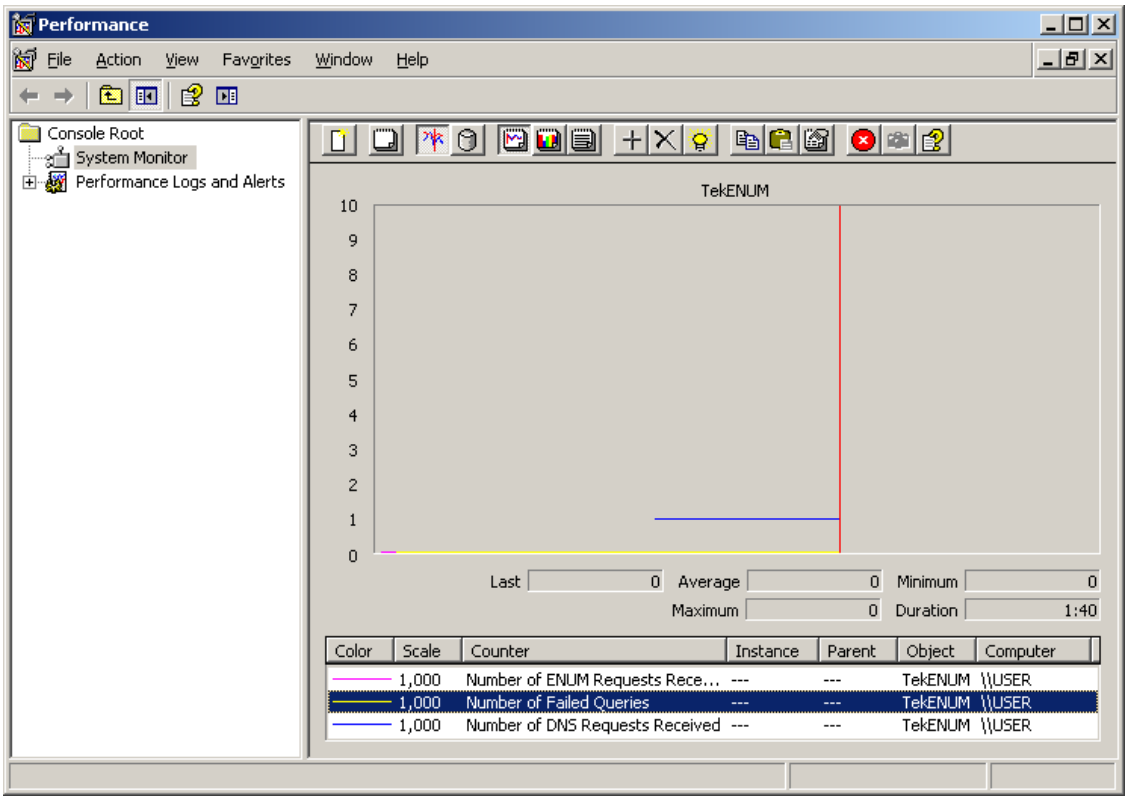


Figure - 9. TekENUM counters on Windows Performance Monitor

You can add and monitor them using Windows Performance Monitor *(Perfmon.exe)*. You can also monitor these counters through TekENUM Manager and web monitoring interface.

You can use ENUM Resolver utility which can be downloaded from http://www.kaplansoft.com/enumresolver to test your ENUM Server installation.

TekENUM Messages

TekENUM started. Listening to x.x.x.x.
This message notifies that TekENUM service has started.

A valid HTTP server interface password is not specified, disabling HTTP interface.
HTTP password is either empty or cannot read.

Access denied for 'x.x.x.x' to 'example.com'
Associated policy does not allow DNS query for the requested domain.

Access permitted for 'x.x.x.x' to 'example.com'
Associated policy allows DNS query for the requested domain.

Alert message sent...
An e-mail alerting message has been sent.

Cached Parent Reply found for example.com…
A cached response has been found in the memory cache.

Cannot initialize Pipe Server…
Pipe server for GUI – service interconnection cannot be initialized.

Cannot read registration key; working in freeware mode.
Check if you have proper Registration.key file in the TekENUM application directory.

Cannot reset performance counters…
TekENUM cannot reset performance counters manually. Check the following error message

Cannot set performance counter 'CounterName'…
TekENUM cannot set a performance counter. Check the following error message.

Could not create service counters...
TekENUM cannot create performance counters. Check the following error message

Could not start TekENUM thread; exiting...
Check if there is conflicting server application running on the same UDP/TCP port. Check also the following error message

Create 'Routes' table on TekENUM database, exiting...
TekENUM cannot create performance counters. Check the following error message.

Create TekENUM database on SQL Server, exiting...
TekENUM cannot create performance counters. Check the following error message.

Listened port is being changed from x to y
TekENUM protocol port is changed through the HTTP interface.

Please check if you have set private key exportable while importing the server certificate.
Please check if the private key of the certificate is accessible by the TekENUM service.

Please check SMTP credentials...
TekENUM cannot send e-mail alerts due to an SMTP credential issue.

Server certificate cannot be found.
Please check server certificate exists in Windows Certificate Store / Local Machnine / Personal folder.

Server certificate not valid; TLS Service is not started.
Server certificate does not have a private key, expired or inaccessible.

Settings saved but service start mode could not be changed...
Please check privileges for the service account associated with TekENUM service

SQL Server connection error, exiting...
TekENUM cannot access the SQL server. Check your configuration and network settings.

Warning! Selected server certificate is expired. Server certificate is updated.
Certificate is expired but a new certificate with the same subject found and set automatically.