Leveraging z/OS Communications Server Application Transparent Transport Layer Security (AT-TLS) for a Lower Cost and More Rapid TLS Deployment

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z/OS Communications Server
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Agenda

- SSL/TLS Overview
- What is AT-TLS?
- Why use AT-TLS?
- How does AT-TLS work?
- Configuring AT-TLS
Transport Layer Security (TLS/SSL) overview

- Transport Layer Security (TLS) is defined by the IETF **
  - Based on Secure Sockets Layer (SSL)
    - TLS defines SSL as a version of TLS for compatibility
- Provides secure connectivity two TLS security session endpoints
  - TLS session
- Full application payload encryption and data authentication / integrity
- TLS security session endpoint plays either a client or server role
- Session endpoint authentication typically via X.509 certificates
  - Server authentication required
  - Client authentication optional (mutual authentication)

** For our purposes, SSL and TLS are equivalent and one term implies the other
1. Client application initiates TLS handshake which authenticates the server (and, optionally, client) and negotiates a cipher suite to be used to protect data.

Upon successful completion of the handshake, a secure TLS session exists for the application partners.

2. Data flows through secure session using symmetric encryption and message authentication negotiated during handshake.

Data flows through secure TLS session.
Transport Layer Security enablement

- TLS traditionally provides security services as a socket layer service
  - TLS requires reliable transport layer,
    - Typically TCP (but architecturally doesn’t have to be TCP)
  - UDP applications cannot be enabled with traditional TLS
    - There is now a TLS variant called Datagram Transport Layer Security (DTLS) which is defined by the IETF for unreliable transports
- On z/OS, System SSL (a component of z/OS Cryptographic Services) provides an API library for TLS-enabling your C and C++ applications
- Java Secure Sockets Extension (JSSE) provides libraries to enable TLS support for Java applications
  - However, there is an easier way…

... **Application Transparent TLS!**
z/OS Application Transparent TLS overview

- **Stack-based TLS**
  - TLS process performed in TCP layer (via System SSL) without requiring any application change (transparent)
  - AT-TLS policy specifies which TCP traffic is to be TLS protected based on a variety of criteria
    - Local address, port
    - Remote address, port
    - Connection direction
    - z/OS userid, jobname
    - Time, day, week, month

- **Application transparency**
  - Can be fully transparent to application
  - An optional API allows applications to inspect or control certain aspects of AT-TLS processing – “application-aware” and “application-controlled” AT-TLS, respectively

- **Available to TCP applications**
  - Includes CICS Sockets
  - Supports all programming languages except PASCAL

- **Supports standard configurations**
  - z/OS as a client or as a server
  - Server authentication (server identifies self to client)
  - Client authentication (both ends identify selves to other)

- **Uses System SSL for TLS protocol processing**
  - Remote endpoint sees an RFC-compliant implementation
  - Interoperates with other compliant implementations
Some z/OS applications that use AT-TLS

- CommServer applications
  - TN3270 Server
  - FTP Client and Server
  - CSSSMTP
  - Load Balancing Advisor
  - IKE NSS client
  - NSS server
  - Policy agent
- DB2 DRDA
- IMS-Connect
- JES2 NJE
- Tivoli Netview applications
  - MultiSystem Manager
  - NetView Management Console
- RACF Remote Sharing Facility
- CICS Sockets applications
- 3rd Party applications
- Customer applications
Advantages of using AT-TLS

- **Reduce costs**
  - Application development
    - Cost of System SSL integration
    - Cost of application’s TLS-related configuration support
  - Consistent TLS administration across z/OS applications
  - Gain access to new features with little or no incremental development cost

- **Complete and up-to-date exploitation of System SSL features**
  - AT-TLS makes the vast majority of System SSL features available to applications
  - AT-TLS keeps up with System SSL enhancements – as new features are added, your applications can use them by changing AT-TLS policy, not code

- **Ongoing performance improvements**
  Focus on efficiency in use of System SSL

- **Great choice if you haven’t already invested in System SSL integration**
  Even if you have, consider the long-term cost of keeping up vs. short term cost of conversion
AT-TLS application types

- **Not enabled**
  - No policy or policy explicitly disables AT-TLS for application traffic
  - Application may optionally use System SSL directly
  - Applications that use the Pascal API and Web Fast Response Cache Accelerator (FRCA) fall into this category

- **Basic**
  - Policy enables AT-TLS for application traffic
  - Application is unchanged and unaware of AT-TLS
  - Application protocol unaffected by use of AT-TLS (think HTTP vs. HTTPS)

- **Aware**
  - Policy enables AT-TLS for application traffic
  - Application uses the SIOCTTLSCTL ioctl to extract AT-TLS information such as partner certificate, negotiated version and cipher, policy status, etc.

- **Controlling**
  - Policy enables AT-TLS and specifies ApplicationControlled ON for application traffic
  - Application protocol may negotiate the use of TLS in cleartext with its partner
  - Application uses the SIOCTTLSCTL ioctl to extract AT-TLS information (like an aware application) and to control TLS operations:
    - Start secure session
    - Reset session
    - Reset cipher
SSL/TLS application types

- As soon as a connection has been established with the server, the SSL/TLS handshake starts.
- Examples are the HTTPS port (443), and FTP's secure port (990).
- AT-TLS considerations:
  - Can be done totally transparent to application code
    - This is referred to as an AT-TLS "Basic" application
  - Optionally the application may query SSL/TLS attributes, such as client user ID (if client authentication is used, cipher suite in use, etc)
    - This is referred to as an AT-TLS "Aware" application
- Application protocol includes verbs to negotiate security protocol and options.
- Examples are FTP that uses the AUTH FTP command to negotiate use of SSL/TLS or Kerberos, and in some cases a TN3270 server port (Conntype NegtSecure).
- AT-TLS considerations:
  - Application needs to "tell" AT-TLS when to start the SSL/TLS handshake
    - This is referred to as an AT-TLS "Controlling" application
  - Otherwise, use of AT-TLS is transparent to application
  - Optionally the application may query SSL/TLS attributes, such as client user ID (if client authentication is used, cipher suite in use, etc)
TLS configuration cases by application type

- **TLS enabled application**
  - Each application has its own configuration to control security policy and TLS functions

- **AT-TLS basic application**
  - All applications' security policy and TLS functions are governed by a single, consistent AT-TLS policy system-wide

- **AT-TLS aware or controlling applications**
  - Application specific policy retained but reduced to what application needs for awareness or controlling functions
  - AT-TLS policy continues to control overall AT-TLS function for the application
AT-TLS basic operation (z/OS as server)

Setup: AT-TLS policy is configured and deployed for the TCP application and the TCP application is started.

1. Client connects to server and connection is established
2. After accepting the new connection, the server issues a read request on the socket. The TCP layer checks AT-TLS policy and sees that AT-TLS protection is configured for this connection. As such, it prepares for the client-initiated TLS handshake
3. The client initiates the SSL handshake and the TCP layer invokes System SSL to perform the TLS handshake under identity of the server.
4. Client sends data traffic under protection of the new TLS session
5. TCP layer invokes System SSL to decrypt the data and then delivers the cleartext inbound data to the server

Unencrypted (cleartext) flows
SSL/TLS handshake flows
SSL/TLS-secured (encrypted) flows
AT-TLS basic operation (z/OS as client)

Setup: AT-TLS policy is configured and deployed for the TCP application and the TCP application is started.

1. z/OS client connects out to server and connection is established
2. TCP layer invokes System SSL to perform the TLS handshake under identity of the client application
3. z/OS client sends data to server
4. TCP layer invokes System SSL to encrypt queued data and then sends it to server
5. Server sends encrypted data, TCP layer invokes System SSL to decrypt it
6. TCP delivers inbound data to z/OS client in the clear

<table>
<thead>
<tr>
<th>Unencrypted (cleartext) flows</th>
<th>SSL/TLS handshake flows</th>
<th>SSL/TLS-secured (encrypted) flows</th>
</tr>
</thead>
</table>
Mapping AT-TLS policy to a TCP connection

- An AT-TLS policy rule describes TLS requirements for a TCP connection
- **Policy rule** is mapped to a connection based on policy condition
  - TCP/IP resource attributes
  - Connection type attributes
  - Local application attributes
- An AT-TLS policy rule is mapped to a connection at well defined points
  - Outbound Connect
  - First Select/Send/Receive
  - SIOCCTTLSCTL ioctl
- If a rule match is found, TCP/IP stack provides TLS protocol control based on the **policy action**
- Alternate method of mapping policy to a connection
  - Secondary Map
    - Used for applications that have one or more “secondary” connections and one “primary” connection
    - Examples: FTP, rsh, rexec

![Diagram showing the mapping process from AT-TLS Policy to TCP connection](image-url)
## AT-TLS policy conditions

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local address</td>
<td>Local IP address</td>
</tr>
<tr>
<td>Remote address</td>
<td>Remote IP address</td>
</tr>
<tr>
<td>Local port</td>
<td>Local port or ports</td>
</tr>
<tr>
<td>Remote port</td>
<td>Remote port or ports</td>
</tr>
<tr>
<td>Connection direction</td>
<td>• Inbound (applied to first Select, Send, or Receive after Accept)</td>
</tr>
<tr>
<td></td>
<td>• Outbound (applied to Connect)</td>
</tr>
<tr>
<td></td>
<td>• Both</td>
</tr>
<tr>
<td>User ID</td>
<td>User ID of the owning process or wildcard user ID</td>
</tr>
<tr>
<td>Jobname</td>
<td>Jobname of the owning application or wildcard jobname</td>
</tr>
<tr>
<td>Time, Day, Week, Month</td>
<td>When filter rule is active</td>
</tr>
</tbody>
</table>
### AT-TLS policy actions

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLS enablement</td>
<td>Specifies whether TLS is enabled for connection matching the policy rule</td>
</tr>
<tr>
<td>TLS/SSL versions allowed</td>
<td>SSLv2, SSLv3, TLSv1, TLSv1.1</td>
</tr>
<tr>
<td>Cipher suites</td>
<td>Set of potential cryptographic algorithms (in order of preference) that this TLS server or client will accept during the TLS handshake</td>
</tr>
</tbody>
</table>
| Role                                  | • TLS client  
  • TLS server  
  • TLS server with client authentication                                                                                                      |
| Client authentication type            | • Passthru (bypass checking)  
  • Required  
  • Full (Accepted if provided by client)  
  • SAFCheck                                                                                                                                          |
| Authentication information            | • Keyring identifier  
  • Certificate label used for authentication  
  • LDAP for certificate revocation list (CRL) processing                                                                                          |
| Data trace                           | Specifies whether to trace cleartext in datatrace or ctrace                                                                                        |
| AT-TLS trace levels                   | Specifies level of tracing                                                                                                                |
| Handshake timeout                    | Time to wait for handshake to complete                                                                                                         |
| Session key lifetime                  | When session key has been used this specified time period, a new session key must be created                                               |
| Session ID requirements               | Session ID cache size, Session ID timeout, Use sysplex-wide session ID cache                                                                   |
| Secondary map used                    | Specifies whether a matching connection should be used as a "primary" connection in the "secondary policy mapping method" |
Recent AT-TLS enhancements

AT-TLS keeps up with System SSL enhancements – as new features are added, your applications can use them by changing AT-TLS policy, not code. Here is a list of capabilities added recently.

- **TLS V1.1**
- **TLS Extensions (RFC 4366)**
  - Negotiation and use of a truncated HMAC
  - Negotiation and use of a maximum SSL fragment size
  - Negotiation and use of handshake server name indication
- **CRL LDAP server access security level**
  - Option added to select security level setting for using LDAP servers with Certificate Revocation Lists (CRL)
- **Certificate validation using RFC 3280**
  - AT-TLS provides an option to select certificate validation method between using RFC 2459, RFC 3280, or any certificate validation method
- **Accessing certificates stored in ICSF with PKCS #11 tokens**
  - Accept PKCS #11 tokens in TTLSKeyRingParms statement
- **FIPS 140-2**
  - In z/OS V1R11, AT-TLS can be configured to invoke System SSL in the FIPS 140-2 compliant mode.
    - FIPS 140-2 can be selectively enabled in the AT-TLS policy configuration
AT-TLS configuration task steps

- Obtain x.509 certificates and update RACF keyrings
- Update any application-specific configuration files if necessary
- Enabling use of AT-TLS in the TCP/IP stack configuration
- Create AT-TLS policy using Configuration Assistant for z/OS Communications Server
- Create policy infrastructure using Configuration Assistant application setup task checklist
My corporation: ABC

1. Generate a key-pair:
   - A private key
   - A matching public key

2. Generate a certificate request document and (e-mail to a Certificate Authority

ABC Certificate Request

- Name and address of my ABC corporation
- My web URI
- ...
- ABC public key

3. Send ABC's certificate – signed with the CA’s private key

4. ABC Certificate

- Name and address of my ABC corporation
- My web URI
- ...
- ABC public key
- Signed with the CA’s private key

5. CA Certificate

CA Certificate installed as a trusted root (a CA)

User Alice

1. Verify validity of ABC’s certificate by decrypting signature using CA’s public key and compare to content of the certificate
   - If they match, the certificate was indeed issued by our trusted CA
2. Because ABC trusted the CA, and Alice trusts the CA, Alice can now trust ABC

1. Validate request and requestor
2. Generate ABC certificate – signed with the CA’s private key
3. Send ABC’s certificate back to ABC
Certificates in action: SSL server authentication
What is needed for z/OS Server authentication only (which is sufficient for encrypted data exchange)

1. Verify server certificate has not expired
2. Verify server certificate is valid using CA's public key
3. Do optional checks on the server certificate
4. Store server's public key for later use
5. Generate symmetric key and encrypt under server's public key

- CA may be an external CA, such as Verisign, or it may be an in-house CA
  - In both cases, the CA root certificate needs to be present at both the client and the server side
- The server certificate is signed by the CA and is stored on the server side
  - On z/OS, this will typically be the default certificate in the server's started task user ID's key-ring in RACF
- During SSL handshake, the server certificate (not the server private key) is sent to the client
  - The client verifies the certificates signature using the CA public key in its copy of the CA certificate
In a production environment, you would not need a self-signed root certificate. To sign server and personal certificates, you would use your company root certificate or an external Certificate Authority.

For testing, a self-signed root certificate is useful. It allows you to familiarize yourself with keys and certificates and allows you to thoroughly test your secure FTP setup on z/OS before deploying it in production.
Create server certificate signed with your own root certificate

```
RACDCERT ID(TCPCS) GENCERT +
  SUBJECTSDN( +
    CN('MVS098 Server Certificate') +
    OU('Z/OS CS V1R11', 'ENS', 'AIM', 'SWG') +
    O('IBM') +
    L('Raleigh') +
    SP('NC') +
    C('US') ) +
  SIZE(1024) +
  NOTBEFORE(DATE(2010-02-01)) +
  NOTAFTER(DATE(2020-12-31)) +
  WITHLABEL('ABCTLS TCPSERV') +
  KEYUSAGE(HANDSHAKE DATAENCRYPT DOCSIGN) +
  ALTNAME( +
    DOMAIN('mvs098.tcp.raleigh.ibm.com') ) +
  SIGNWITH(CERTAUTH LABEL('ABCTLS CA'))
```

- In a production environment, you would use an alternative procedure after having generated the server key pair and certificate:
  - You would generate a certificate signing request and send it to your CA
  - Your CA would process your request and create a certificate signed with the CA private key
  - You would import the signed certificate into RACF

Create a server certificate signed with your own root certificate and a private/public key pair:

- `ID(userID)` – the started task user ID of your server
- `KEYUSAGE(HANDSHAKE DATAENCRYPT DOCSIGN)`
- `SIGNWITH(CERTAUTH LABEL('your rot certificate'))`
Alternative: use an external CA to sign your server certificate

RACDCERT ID(TCPCS) GENCERT +
   SUBJECTSDN( +
      CN('MVS098 Server Certificate') +
      OU('Z/OS CS V1R11', 'ENS', 'AIM', 'SWG') +
      O('IBM') +
      L('Raleigh') +
      SP('NC') +
      C('US') ) +
   SIZE(1024) +
   NOTBEFORE(DATE(2010-02-01)) +
   NOTAFTER(DATE(2020-12-31)) +
   WITHLABEL('ABCTLS TCPSERV') +
   KEYUSAGE(HANDSHAKE DATAENCRYPT DOCSIGN) +
   ALTNAME( +
      DOMAIN('mvs098.tcp.raleigh.ibm.com') )
RACDCERT ID(TCPCS) GENREQ (LABEL('ABCTLS TCPSERV')) +
   DSN('USER1.PKITEST.SERVERS.REQ')

(**** delay here while CA processes your request ****)

RACDCERT ID(TCPCS) +
   ADD('USER1.PKITEST.SERVERS.CRT') +
   TRUST +
   WITHLABEL('ABCTLS TCPSERV')

Create a server certificate and a private/public key pair:
- ID(userID) – the started task user ID of your server
- KEYUSAGE(HANDSHAKE DATAENCRYPT DOCSIGN)

Generate a request to have the certificate signed by an external CA
- Send the request to the CA
- Receive the response from the CA

Add the signed certificate into RACF

If not already there, you also need to add the CA’s root certificate to RACF as a CERTAUTH certificate
Create your z/OS server started task user ID key-ring and connect required certificates to it.

Digital ring information for user TCPCS:

Ring:
>TLSRING<

<table>
<thead>
<tr>
<th>Certificate Label Name</th>
<th>Cert Owner</th>
<th>USAGE</th>
<th>DEFAULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABCTLS CA</td>
<td>CERTAUTH</td>
<td>CERTAUTH</td>
<td>NO</td>
</tr>
<tr>
<td>ABCTLS TCPSERV</td>
<td>ID(TCPCS)</td>
<td>PERSONAL</td>
<td>YES</td>
</tr>
</tbody>
</table>

In order for the remote client to successfully authenticate server certificates that are signed with our self-signed root certificate, they need a copy of that root certificate in their local key-rings. Download as a text file to your client workstation.

Create key-ring for your started task server user ID.

Connect certificates to the key-ring:
- Your root certificate
- Your server certificate
Certificates in action: SSL client authentication

(implies server authentication as well)
What is needed for z/OS Server and client authentication?

1. Verify server certificate has not expired
2. Verify server certificate is valid using CA's public key
3. Do optional checks on the server certificate
4. Store server's public key for later use
5. Generate symmetric key and encrypt under server's public key

TCP connection setup

Client

CA certificate w. CA public key
Signed by the CA private key
Client certificate w. client public key
Client key-ring

TCP connection setup

z/OS Server

CA certificate w. CA public key
Signed by the CA private key
Server certificate w. server public key
Server key-ring

Hello – I want to use SSL/TLS
Hello – OK, me too!!
And here is my server certificate
And I want to see your client certificate

Server certificate w. server public key

Client certificate w. client public key
Encrypted under your public key
And here is my client certificate

Client

Here is our secret symmetric key
Signed by the CA private key
Server private key

Key-ring of the client user ID

Key-ring of the server started task user ID

1. Verify client certificate has not expired
2. Verify client certificate is valid using CA's public key
3. Do optional checks on the client certificate
   - Does it map to a RACF user ID (authentication level 2)
   - Is the user permitted to use this service (authentication level 3)
Enabling use of AT-TLS in the TCP/IP stack

- AT-TLS is enabled via a TCPCONFIG parameter
  
  ```
  TCPCONFIG TTLS ; Enable AT-TLS policies
  ```

- There may be a short time period between TCP/IP parsing this configuration option and the actual AT-TLS policies being installed into the stack by Policy Agent
  - Since the stack doesn’t yet have an AT-TLS policy, it doesn’t know which connections to secure
  - What should it do if a new connection is being set up during this short time window?
  - You control that via a SERVAUTH profile:
    - `EZB.INITSTACK.system.stackname`

  - When TCP/IP starts with TCPCONFIG TTLS specified, it will issue message EZZ4248E
    
    ```
    EZZ4248E TCPCS WAITING FOR PAGENT TTLS POLICY
    EZZ8771I PAGENT CONFIG POLICY PROCESSING COMPLETE FOR TCPCS : TTLS
    EZZ4250I AT-TLS SERVICES ARE AVAILABLE FOR TCPCS
    ```

  - Between messages EZZ4248E and EZZ4250I, the TCP/IP stack will only allow users permitted to the `EZB.INITSTACK.system.stackname` SERVAUTH profile to establish TCP connections.
  - Note: make sure all your pertinent server address spaces (including PAGENT and OMPROUTE) run under user IDs that are permitted to this profile.
Some application configuration changes may be necessary if the application is either AT-TLS aware or AT-TLS controlling.

The FTP server is both AT-TLS aware and controlling.

Example below defines an FTP server that supports SSL/TLS connections, but does not require it.

- It depends on the client sending an AUTH command or not.

SSL/TLS is done by ATTLS in this example.

<table>
<thead>
<tr>
<th>EXTENSIONS</th>
<th>AUTH_TLS</th>
<th>; Enable TLS authentication</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLSMECHANISM</td>
<td>ATTLS</td>
<td>; Server-specific or ATTLS</td>
</tr>
<tr>
<td>SECURE_FTP</td>
<td>ALLOWED</td>
<td>; Security required/optional</td>
</tr>
<tr>
<td>SECURE_LOGIN</td>
<td>NO_CLIENT_AUTH</td>
<td>; Client authentication</td>
</tr>
<tr>
<td>SECURE_PASSWORD</td>
<td>REQUIRED</td>
<td>; Password requirement</td>
</tr>
<tr>
<td>SECURE_CTRLCONN</td>
<td>PRIVATE</td>
<td>; Minimum level of security CTRL</td>
</tr>
<tr>
<td>SECURE_DATACONN</td>
<td>PRIVATE</td>
<td>; Minimum level of security DATA</td>
</tr>
<tr>
<td>TLSRFCLEVEL</td>
<td>RFC4217</td>
<td>; SSL/TLS RFC Level supported</td>
</tr>
</tbody>
</table>
Policy-based network security on z/OS: Configuration Assistant

- Configures:
  - AT-TLS
  - IPSec and IP filtering
  - IDS
  - Quality of Service
  - Policy-based routing

- Separate perspectives but consistent model for each discipline

- Focus on concepts, not details
  - what traffic to protect
  - how to protect it
  - De-emphasize low-level details (though they are accessible through advanced panels)

- z/OSMF-based web interface (strategic) or standalone Windows application

- Builds and maintains
  - Policy files
  - Related configuration files
  - JCL procs and RACF directives

- Supports import of existing policy files

Download the Windows version at http://tinyurl.com/cgoqsa
Configuration Assistant policy creation approach

- Wizards and dialogs guide you through a top-down approach to configuration
  - Navigational tree supports a bottom-up approach
    - Allows an experienced user to bypass wizard screens

- Define system images and TCP/IP stacks
- Define security levels (reusable)
  - Protection suites (e.g. gold, silver, bronze)
- Define requirements map (reusable)
  - How to protect common scenarios (e.g. intranet, branch office, business partner)
  - Set of traffic descriptors linked to security level
- Define connectivity rules
  - A complete security policy for all traffic between two endpoints
  - Specified data endpoints linked to a requirements map

*Optimizations to this approach are provided for common applications!*
1. Create system image and TCP/IP stack image
2. Create one or more Requirement Maps to define desired security for common scenarios (e.g. intranet, branch office, business partner)
   - Create or reuse Security Levels to define security actions
   - Create or reuse Traffic descriptors to define application ports to secure
3. Create one or more Connectivity Rules between Data Endpoints (IP addresses) and associate with a configured Requirement Map
AT-TLS rule simplification with “pre-defined rules”

- In z/OS V1R11, configuration of AT-TLS policy definition was simplified so that policy rules for common applications can be configured in a few clicks.

- The Configuration Assistant provides predefined AT-TLS connectivity rules for common applications configured for each stack.

- In most cases, these rules need no modification and can be enabled for immediate use.

- Each rule defines an application with default port settings, key ring, and is associated with a default security level.

- The administrator can easily enable the rules they want to have in their policy and install the generated flat file.

  The examples that follow use the pre-defined rule approach....
Add a z/OS image
Add a TCP/IP stack
Set default key ring at the image level
Predefined connectivity rules are now configured for each stack.
Preparing the TN3270 pre-defined connectivity rule
Describe traffic

![Modify Rule dialog box](image)

- AT-TLS rule name: `Default_TN3270-Server`
- Specify settings:
  - Traffic:
    - Local port: `Ports: 23`
    - Remote port: `Ports: `
  - Indicate the TCP connect direction:
    - Inbound only
  - Specify jobname and user ID:
    - Jobname: 
    - User ID: 

Buttons:
- OK
- Cancel
- Help
Describe role – Not changeable
Define key ring – in this case use the z/OS image level key ring
Describe data endpoints – in this case apply rule to all endpoints
Specify details of TLS protection

![Modify Rule Window]

- **AT-TLS rule name:**
  - Rule name: Default_TN3270-Server
  - Enable rule

- **Specify settings**
  - Traffic | Role | Key Ring | Data Endpoints | Security Level | Advanced

- **Select the security level that will protect this traffic descriptor**
  - Security levels
  - Select a security level:
    - Default_Ciphers - IBM supplied: 3DES, AES-256 bit, AES-128 bit encryption
    - New... Copy... Modify... View Details Show Where Used

- **Buttons:** OK, Cancel, Help
Enable rule
Pre-defined TN3270 server rule is now enabled
Application setup task checklist guide to setting up policy infrastructure

Assistance with the z/OS System Preparation Tasks – Use the Application Setup Task Checklist
For more information…

- IBM Configuration Assistant for z/OS Communications Server V1R12 download at http://www.ibm.com/support/docview.wss?uid=swg24013160

- IBM z/OS V1R12 Communications Server TCP/IP Implementation Volume 4: Security and Policy-Based Networking (SG24-7899)

- z/OS Communications Server V1R12 IP Configuration Guide (SC31-8775)

- z/OS Communications Server V1R12 IP Configuration Reference (SC31-8776)

- z/OS V1R12 Cryptographic Services System SSL Programming (SC24-5901-09)
For more information…

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