IBM eServer™

Applications: TN3270

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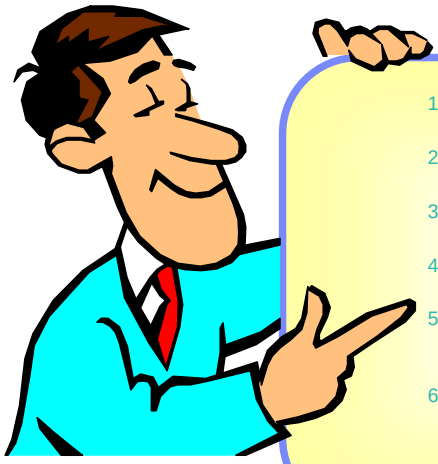
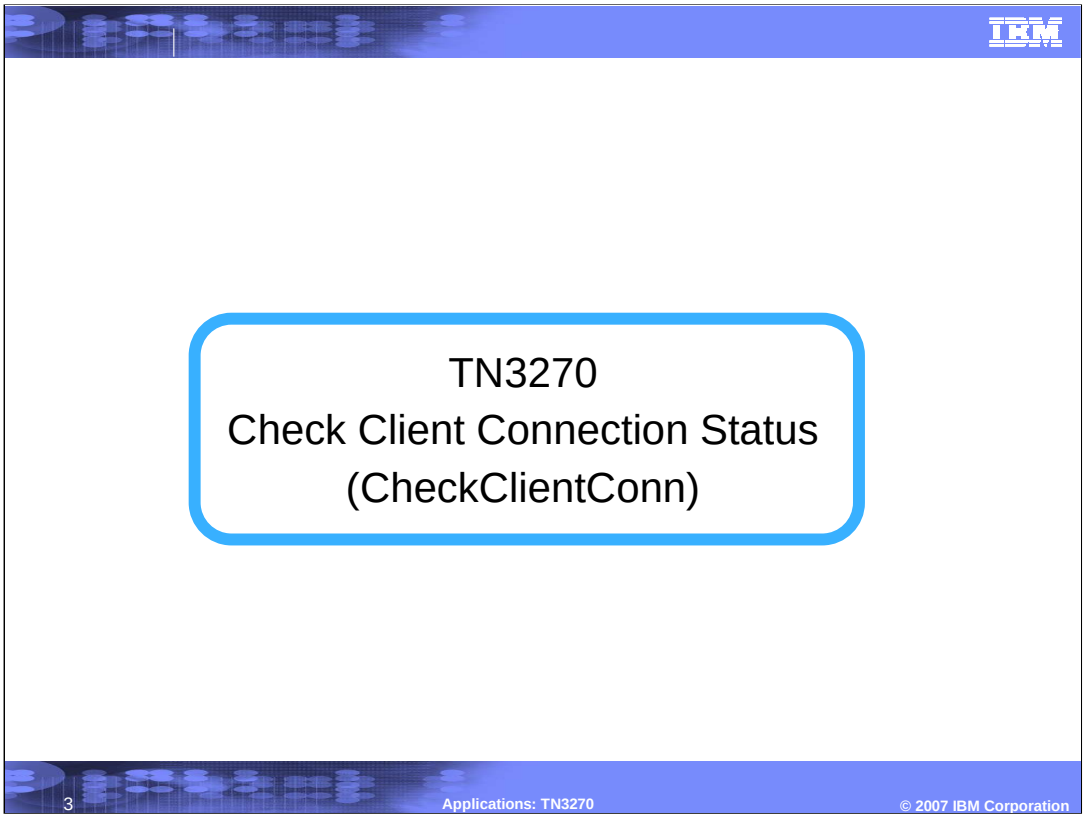
Agenda - TN3270 Updates



1. **Check Client Connection status**
2. **Use the LU Exit to assign USS tables**
3. **Allow System Symbolics in USS tables**
4. **Add a timer for Queued Sessions**
5. **New ways to collect Performance Monitoring Data**
6. **Obsolete statements**


TN3270
Check Client Connection Status
(CheckClientConn)
3
Applications: TN3270
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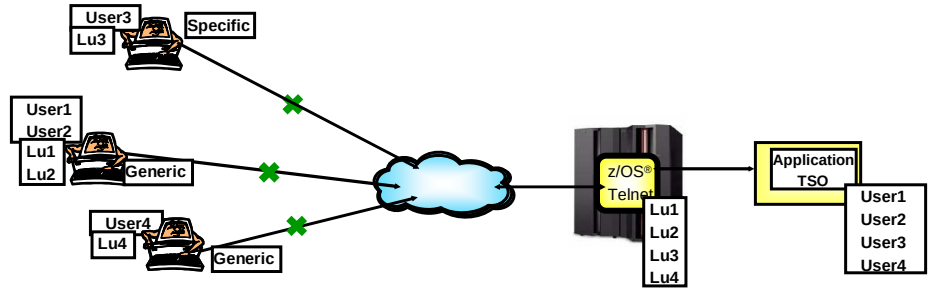
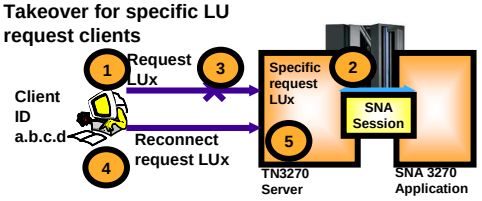
Background Information: clients losing connectivity temporarily

- **A route is lost or a workstation is accidentally powered off while in an SNA session using Telnet.**
- **The Telnet server is not aware of the lost connection.**
  - The SNA session remains active.
    - The Telnet LU remains active and in use by both the TN3270 server and VTAM®.
    - The application userid remains in use and logged on to the SNA application or subsystem (CICS®, TSO, IMS™,...).
- **When the end user attempts to reconnect, the request is rejected.**
  - The LU was specified
    - Telnet will reject because the LU is already in use.
  - A new LU is assigned
    - The application may reject the new login because the userid is already in use - especially TSO will behave this way.



TN3270 server existing reconnect and takeover technologies

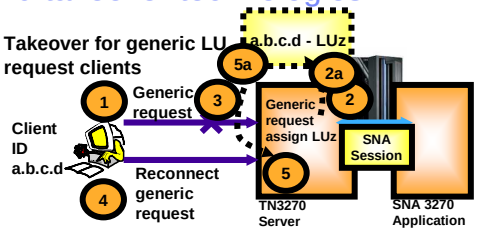
Takeover for specific LU request clients



TKOSPECLU and TKOSPECLURECON

1 Initiate connection for establishing an LU2 session using LU LUx.
2 TN3270E Server allows LU name LUx and user connects to SNA application.
3 Network has a hiccup and client to server IP connection is broken
4 Client sends a new connection (reconnect) request
5 TN3270 server recognizes connect from known client ID with same LU name that already is in use from that client ID and reconnects the user with the SNA application:
- 5a. Telnet suspends new request
- 5b. Sends TimeMark to original client end point
- 5c. If response, rejects new request
- 5d. If no response, new request continues setup with original LU and copies all relevent session info.

Takeover for generic LU request clients



TKOGENLU and TKOGENLURECON

1 Initiate connection without specifying an LU name.
2 TN3270E Server assigns LU name LUz and user connects to SNA application.
- 2a. Telnet adds Client ID/LU name to in-storage table.

3 Network has a hiccup and client to server IP connection is broken
4 Client sends a new connection (reconnect) request
5 TN3270 server recognizes connect from known client (a.b.c.d) and picks up the already assigned LU name from the in-storage table to simulate a Specific LU request and reconnects the user with the SNA application:
- 5a. Telnet finds entry in in-storage table for this client
- 5b. Telnet suspends new request
- 5c. Sends TimeMark to orignal client
- 5d. If response, rejects new and next available Generic LU is assigned.
- 5e. If no response, new request continues setup with original LU by copying all relevent session info.

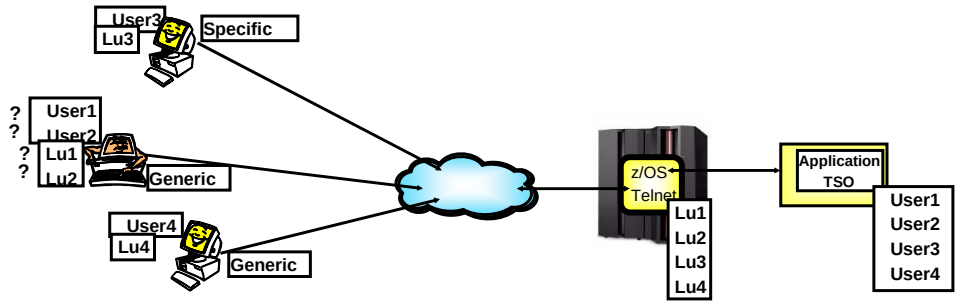
6 At disconnect time, Telnet removes the Client ID - LuName entry from the table.

TKOSPECLU and TKOGENLU - will takeover the LU, but will close the SNA session before the LU is given to the new connection.

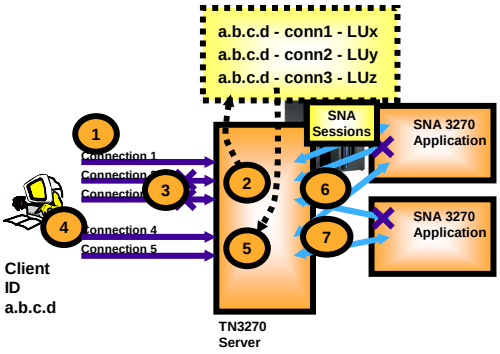
TKOSPECLURECON and TKOGENLURECON - will also takover the LU and keep the SNA session established. For this option, an additional parameter can be specified to ensure the session is indeed taken over from the same IP address (the client-ID could be based on something else, such as a host name where the underlying IP address could have changed)

TN3270 re-connect/takeover helps in some cases

- **Takeover (re-connect) can help in cases where only a single emulator session is used from a given client ID (client IP address or host name).**
  - If LU names are specified by the client (Specific LU request as supported by TN3270E protocols)
    - Takeover of a Specific-request connection will work (implemented in OS/390® R10).
  - If no LU name is specified by the client (Generic request)
    - Takeover of a Generic-request connection will work (implemented in z/OS V1R5).
- **Many customers have Generic request configurations with many emulator sessions on a single workstation.**
  - Neither Specific nor Generic takeover will end the existing SNA session.
- **Keepalive function (TCPIP or Telnet) to clean up lost connections for all TN3270 connections is too costly (CPU & Network).**
  - Some customers use ScanInterval/Timemark. High CPU cost and network impact.



New CheckClientConn solution added - basics of operation



- ✓"Just-in-time, selected timemark processing"
  - Avoids CPU and network overhead of repetitive timemark processing of all connections
- ✓Cleans up all connections from same workstation when first connection is re-established
- ✓Especially useful for TSO sessions where a user ID can only be logged on from one LU at a time

1 Connection 1, 2, and 3 are established from client a.b.c.d - they can be generic, specific, or a mix of both.

2 Telnet accepts or selects LU names, adds the associations into an in-storage table, and establishes SNA sessions with backend SNA applications.

3 A network problem occurs, and the client loses connectivity for connection 2 and 3.

4 The client sends a new connection requests to the telnet server - connection 4 (and maybe also connection 5, which will be delayed until processing for Connection 4 has completed)

5 Telnet recognizes it has more connections already with this client (it believes it has three at this point in time)
- 5a. Suspends connection processing for connection 4
- 5b. Sends timemark on Connection 1, 2, and 3
- 5c. Connection 1 responds to the timemark (is still alive and well) - Telnet logs the response and continues to wait for responses from Connection 2 and 3

6 When the wait time expires, telnet determines Connection 2 and 3 are dead and cleans those connections up including removing the entries in the in-storage table, terminating their SNA sessions, and freeing the LUs that were used (LUy and LUz)

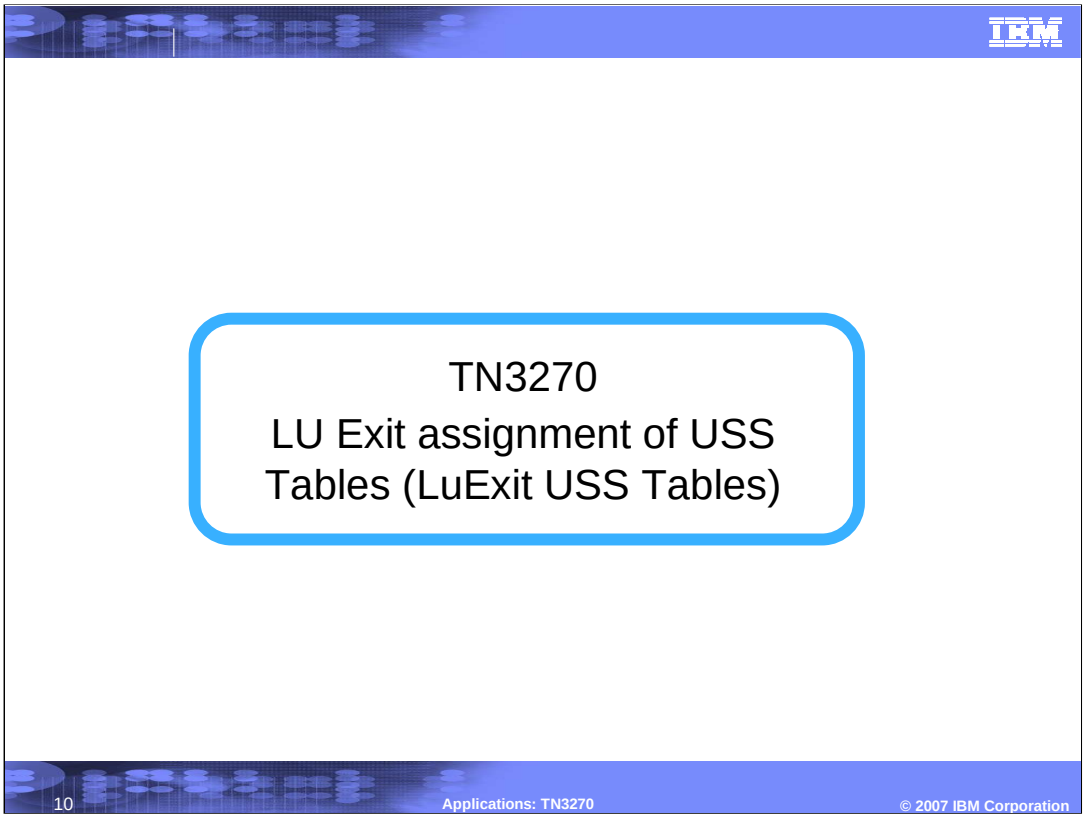
7 Telnet now continues setup for the new connection requests, assigns an LU name (which may be one of those just freed or not), adds new entries to the in-storage table, and starts new SNA sessions

How to request TN3270 use of CheckClientConn

- **CheckClientConn / NoCheckClientConn**
  - CheckClientConn / NoCheckClientConn can be specified at three levels of granularity.
    - TelnetGlobals
    - TelnetParms
    - ParmsGroup
  - CheckClientConn sec [maxconns]
    - ***sec*** - specifies the number of seconds Telnet will wait for clients to respond. Valid range is 1-99999999 seconds. There is no default. sec must be specified. Good value seems to be 5 seconds.
    - ***maxconns*** - specifies the maximum number of connections Telnet will check for a single ClientID. The default is 50. Valid range is 1-99999999 connections.
      - This parameter is important if a large number of clients appear to be coming from a single ClientID (such as through a proxy server or NAT table) and that Client ID can not be excluded with ParmsGroup/ParmsMap statements.
  - NoCheckClientConn
    - No parameters for this statement. Used to turn off CheckClientConn for specific cases.

Things to think about

- **This function must be specified to activate end user initiated Keepalive function for this end user.**
- **Be careful not to use this function if you have a large number of connections with the same remote IP address.**
  - Each new connection will trigger Telnet to send a Timemark to every existing connection leading to high CPU utilization and network congestion.
  - Deactivate the function by:
    - Specifying NoCheckClientConn at a granular level
    - Set the optional MaxConns parameter.
- **This function should be used in place of setting low ScanInterval/Timemark values.**
  - ScanInterval/Timemark is intended for connection cleanup, not connection recovery.
- **If you want the Client Identifier to be a hostname, you must code a hostname group in the profile to trigger hostname lookup.**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LU Exit assignment of USS Tables (LuExit USS Tables)
10
Applications: TN3270
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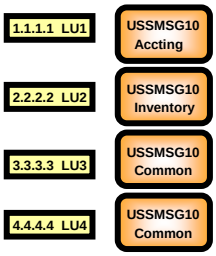
Background Information - assigning USS tables

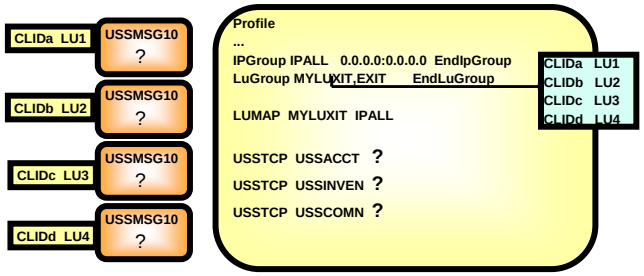
- The initial screen presented to Telnet users is often a USSMSG10 screen.
- Fixed IP addresses or hostnames allow mapping of specific USS tables to specific users.
- Screen content can be configured differently depending on the end user.
- The LU name and the USS table are often functionally linked together and both must be mapped to the same Client Identifiers.




```
Profile
...
LUMAP  LU1  1.1.1.1
USSTCP  USSACCT  1.1.1.1

LUMAP  LU2   2.2.2.2
USSTCP  USSINVEN  2.2.2.2

IPGroup IPGRP1  3.3.3.3  4.4.4.4  EndIpGroup
LuGroup LUGRP1  LU3  LU4   EndLuGroup

LUMAP  LUGRP1   IPGRP1
USSTCP  USSCOMN  IPGRP1
```

How to assign USS tables if the LU exit routine is used?

- **The LU Exit is used to assign LU names in some cases.**
  - Some customers use an LU Exit to map LU names to non-standard Client Identifiers.
  - Or there may be so many exceptions to a Client Identifier range or group that an LU Exit table is easier to maintain.
- **Without mapping statements for both the LU name and the USS table, the LU name / USS table association can not be maintained.**

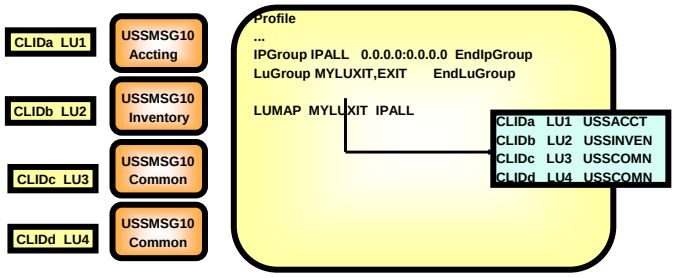


Extensions to the LU exit routine to also determine USS table name

- **Support USS table assignment from the LU Exit routine.**
  - Provide space in the parameter list to return:
    - 3270 format USS table
    - SCS format USS table
    - Interpret table
  - The LU Exit assigned USS table will take precedence over any mapped USS table.
  - The connection must be a TN3270E connection without SimClientLU specified.
    - The LU must be assigned during TN negotiation before the first USSMSG10 screen is sent.
    - Non-TN3270E connections are not assigned an LU name until the application name is chosen. By then, the first USSMSG10 screen has already been sent to the client.

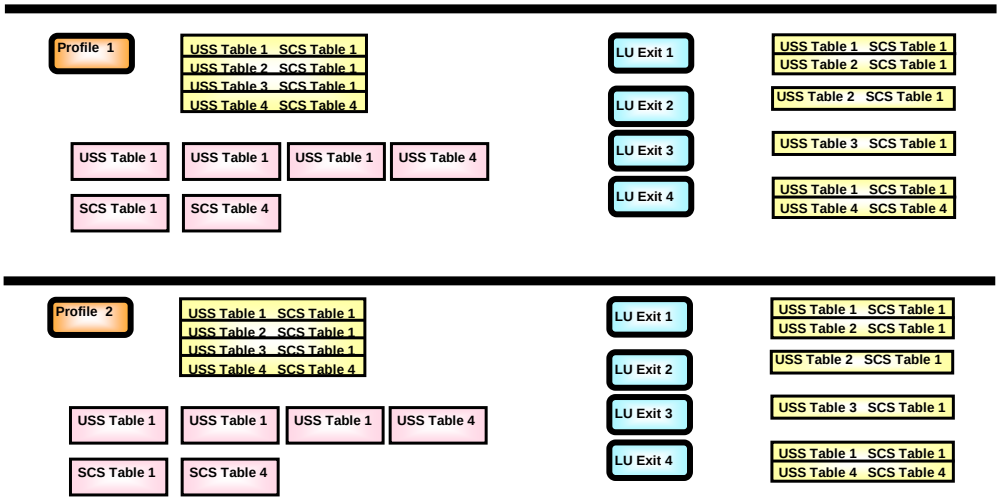
Make sure any LU Exit that assigns USS table names is used only on V1R8 and above.

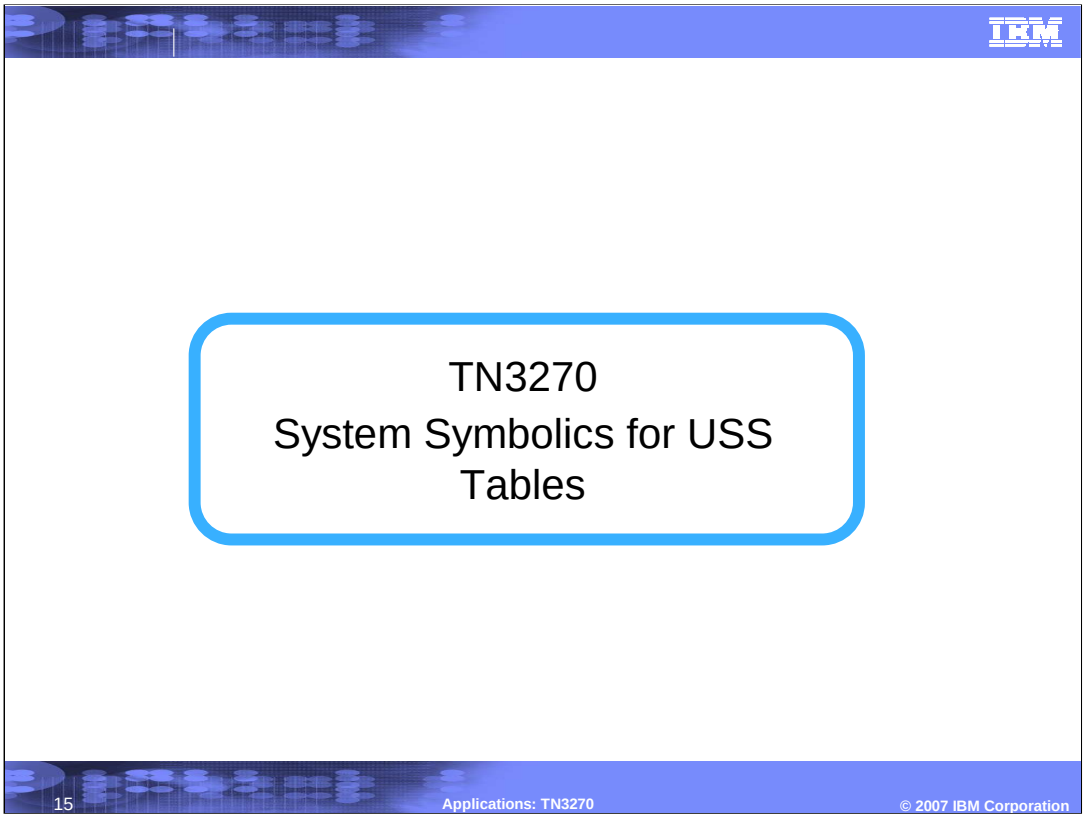
- The parameter list has expanded to accommodate the USS table names. Attempting to write these names into a downlevel parameter list will result in storage overlays!
- Add logic to your LU Exit to verify the input parameter list is version level 2 or higher.



LuExit USS Tables and storage considerations

- A large number of TN3270 profiles, unique table names, or LU Exits will use more storage.
  - For each name pair, a control block exists at the profile level and for each LU Exit.
  - Tables loaded once per profile.

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TN3270
System Symbolics for USS Tables
15
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Background Information on USS tables and symbolics

- **USS tables define commands the end user enters and messages returned.**
  - USSMSG10 - Initial logon panel.
  - Most other USSMSGxx are used to report errors back to the end user.

- **Symbolic substitution for certain variables known to Telnet exist for messages already.**
  - LU name @@LUNAME
  - IP Address @...@IPADDR
  - IP Port @@PRT
  - Hostname @...@IPHOSTNAME
  - Date/Time @@@@DATE/@@@@TIME

```
USSMSG10: Enter: LOGON APPLID() LOGMODE() DATA()

 Port:   01648             Date: 01/18/06
 IPADDR: 9.94.103.223      Time: 15:14:41
```

Add support for system symbolics to USS tables

- **Add support for System Symbolic substitution within TN3270 USS tables.**
  - Specify LUNAME or SCAN on the message as you would for @@ string substitution.
  - Telnet will now also check for System Symbolics in the message string.
    &SYSNAME. &SYSR1.

```
USSMSG10: Enter: LOGON APPLID() LOGMODE() DATA()

Port:   01648              Date: 01/18/06
IPADDR: 9.94.103.223       Time: 15:14:41
System Name: MVS023        Release: MVS018
```

- **Sample section to generate the MSG10 Screen**

```
DC    X'11'                SET BUFFER ADDRESS ORDER
        DC    X'C2E0'              ROW 5 COLUMN 2
        DC    X'1D'                START FIELD
        DC    X'F0'                PROTECT SKIP NORMAL
        DC    C'System Name:   &&SYSNAME.       '
        DC    C'Release: &&SYSR1.     '
```

Note the extra '&' on the symbolic name. This is necessary for the compiler to produce the right symbolic.

Things to think about

- **Remember to add the extra '&' in front of all system symbolics.**
- **The system symbolic support was not added to the native VTAM USS support.**
  - Any system symbolic coded on a shared table will not be converted by VTAM. The symbolic itself will be displayed if the table is used for VTAM USS processing.


TN3270
Queued Session Timer
19
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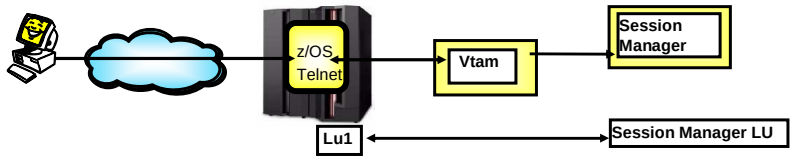
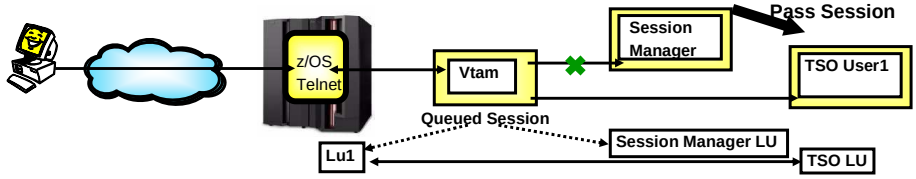
Background Information on how the QSession option works

- **Logged on to the Session Manager (AllowAppl SesMgr QSession)**



- **Selects TSO from the Session Manager logon screen**



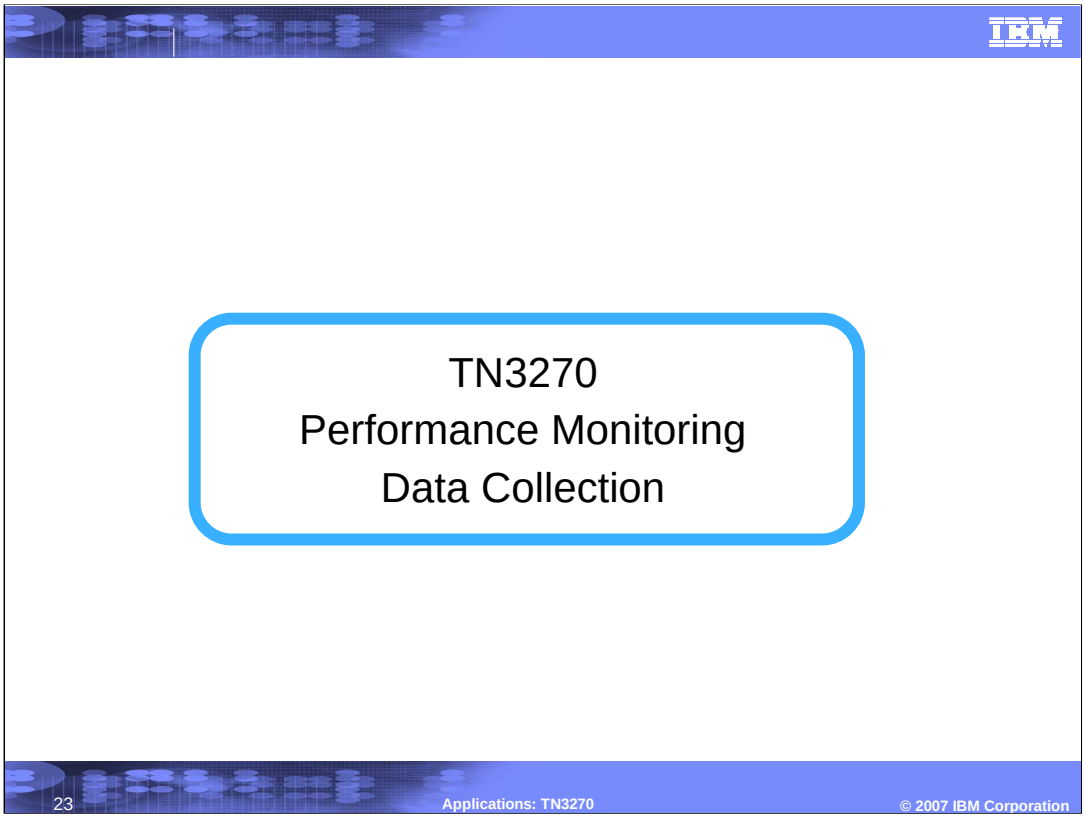
- **User logs off TSO.**
  - VTAM sends UNBIND from TSO to Telnet LU1.
  - Telnet LU1 stays active due to the QSession parameter.
  - VTAM sets up a session between Telnet LU1 and the Session Manager LU.

QSession enhancements needed - QSess Timer

- **If QSession is not specified, Telnet redrives the initial setup**
  - Close the LU ACB
  - Send USSMSG10 / Solicitor Panel --or-- Redrive a default session -- or -- Disconnect
- **If QSession is specified, Telnet keeps the LU ACB open and does not redrive.**
  - Telnet assumes, based on QSession, that a BIND will arrive soon.
  - The end user has no way to enter new commands.
- **Sometimes the Queued SimLogon request can be lost.**
  - If the session manager is inactivated/re-activated while requests are queued.
  - If the link to a cross domain application is broken.
- **Sometimes the Session Manager application is not written correctly**
  - The SimLogon-Q request is never issued.
- **If there is no queued SimLogon request, the end user must disconnect.**
- **A new QSESS timer is being implemented - after receiving an UNBIND, wait for a specified period of time. If no BIND:**
  - Telnet will resume its normal redrive process.
    - Close the LU ACB
    - Send USSMSG10 / Solicitor Panel **--or--** Redrive a default session **-- or --** Disconnect

Things to think about

- **The timer value has to be specified to affect current function.**
- **Set a time high enough to avoid potential conflicts where VTAM is sending a BIND for the queued session at the same time Telnet is cleaning up and redriving the initial setup.**
- **All QSession applications should have some time value set.**
  - Avoid connections being in a wait state, forcing the end user to drop the connection.


TN3270
Performance Monitoring
Data Collection
23
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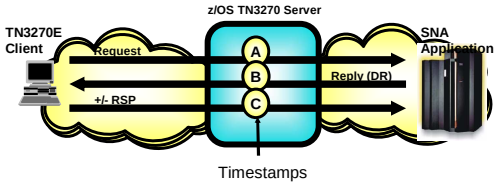
TN3270 Performance data collection

TN3270 Performance Monitoring Data Collection



Response times

```
Round-trip time = Time C - Time A
IP time         = Time C - Time B
SNA time        = Round trip time - IP time
```

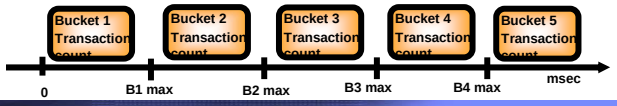
Life-of-connection data for life-of-connection averages

- Transaction count
- Round trip & IP response time totals
- Averages for round trip, IP, and SNA response times

Sum of squares for variance and standard deviation

- Round trip, IP, and SNA sum of squares

Round trip response time counts by time bucket



Sliding window data for sliding window averages

- Period transaction count
- Period round trip & IP response time totals
- Sliding window transaction count
- Sliding window round trip & IP response time totals

Data collection has so far been a little difficult:

- SNMP MIB data
  - Individual connection data returned one connection at a time.
  - Performance issues due to traversing the entire connection table.
- MVS™ console Telnet display command
  - Detail report shows collected data for single connection at time of display

TN3270 Performance data collection extensions in z/OS V1R8

- **Use the Network Management Interface (EZBNMIFR callable API) to collect data.**
  - Bypass SNMP and call Telnet directly.
  - Avoid filtering out non-TN3270 connections.
  - Returns all data in a single large data block instead of returning data for each connection.
  - The same data is reported in the EZBNMIFR quadruplet as is reported with SNMP.

- **Use the Telnet SMF SNA termination record to collect new "Life Of Session" data.**
  - Multiple SNA Sessions are possible during the Life Of a single Connection.
  - Data is reported using the Telnet SMF SNA session termination record (Type 119/subtype 21)
  - Data collected:
    - Transaction count
    - Round trip and IP response time totals
    - Sum of Squares for round trip, IP, and SNA
    - Transaction counts by time bucket
  - Information that can be calculated for the session:
    - Averages for round trip, IP, and SNA response times
    - Variance and Standard deviation for round trip, IP, and SNA response times
  - Sliding window data is not reported because data is collected at end of session.

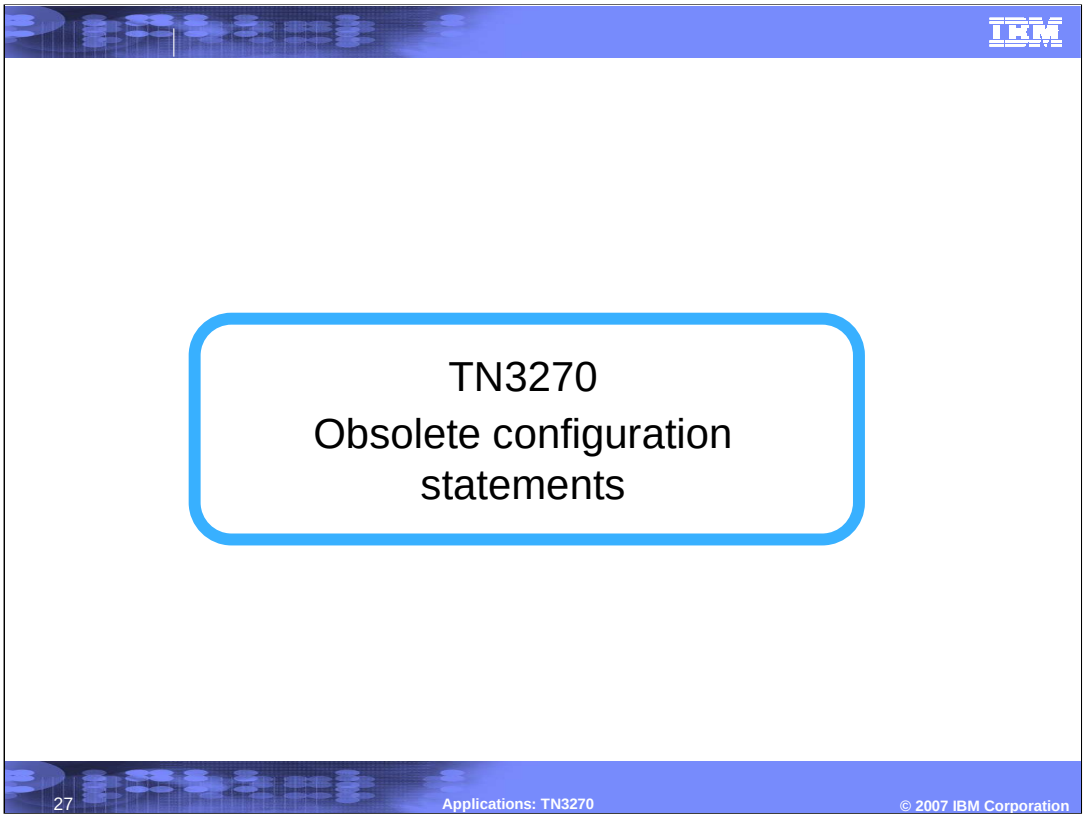
- **MonitorGroup/MonitorMap must be in place for Telnet to capture performance data.**

Things to think about

- **Remember to configure monitoring in the profile.**
  - Create a MonitorGroup and map the group to clients using the MonitorMap statement.
  - You do not need to set up TNSACONFIG if SNMP is not being used.
- **Existing SMF119 Telnet SNA Session termination records (subtype 21) will be larger even if the connection is not being monitored. Two new Triplet headers are added.**

```
BEGINVTAM Block
   MONITORMAP  mongrp_name  client_id

MONITORGROUP  mongrp_name
   AVERAGE/NOAVERAGE
   AVGSAMPMULTIPLIER n
   AVGSAMPPERIOD sec
   BOUNDARY1,BOUNDARY2,BOUNDARY3,BOUNDARY4  msec
   BUCKETS/NOBUCKETS
   DYNAMICDR/NODYNAMICDR
   INCLUDEIP/NOINCLUDEIP
ENDMONITORGROUP
```


TN3270
Obsolete configuration statements
27
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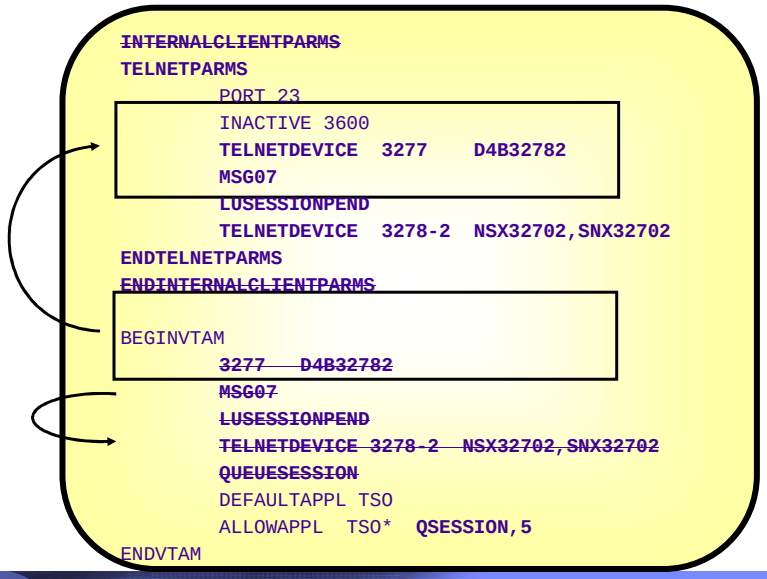
Obsolete TN3270 profile statements

- **Prior to the rewrite of the TN3270 server in 1996**
  - SNA related parameter statements were in the BeginVTAM block.
    - MSG07
    - LuSessionPend
    - TelnetDevice Logmode definitions
    - Logmode definitions without the TelnetDevice statement
    - QueueSession statement applied globally to all DefaultAppls
  - InternalClientParms block

- **By z/OS V1R5**
  - **All** parameter statements are in TelnetGlobals, TelnetParms, or ParmsGroup blocks.
    - MSG07
    - LuSessionPend
    - TelnetDevice Logmode definitions
  - Discouraged use of two statements
    - Logmode definitions without the TelnetDevice statement - Use TelnetDevice
    - QueueSession statement - Use QSession on AllowAppl or RestrictAppl
  - InternalClientParms block was renamed to TelnetParms

Obsolete TN3270 profile statements are now really obsolete!

- **Beginning with z/OS V1R8**
  - You must use the recommended statements in the recommended statement blocks.



Things to think about

- **You MUST make changes if you have:**
  - MSG07, LuSessionPend, or TelnetDevice in BeginVTAM
  - InternalClientParms or QueueSession coded
  - Logmodes defined immediately after BeginVTAM without using the TelnetDevice statement.
- **The profile parser will flag the statements as invalid and they will be ignored.**
  - Telnet will probably still activate but not with the configuration you expected.

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