



Licensed Program Specifications

Transaction Processing Facility Version 4 Release 1 Program Number 5748-T14

IBM Transaction Processing Facility Version 4 Release 1 (referred to as the TPF 4.1 system in the remainder of this book) is an operating system that works with application programs to process transactions for customers in a real-time environment. For example, the TPF 4.1 system can be used for computing needs such as transaction processing, network switching, and front-end processing.

The TPF 4.1 system replaces earlier versions of the TPF product. Customers requiring the TPF 4.1 functions must migrate to the TPF 4.1 system.

The TPF 4.1 system is designed for businesses and organizations that have high online transaction volumes and large networks. Because of its high capacity and high availability characteristics, the TPF 4.1 system is well-suited for environments where growth is expected to be very fast or unpredictable, or where there are high peak periods of transaction activity. It is especially useful for application programs that need high capacity and extremely low cost per transaction.

Very short path lengths for critical system services such as DASD input/output (I/O) help to make efficient use of the TPF 4.1 system resources and to provide a very low cost per transaction.

The TPF 4.1 system includes the base product and the following features:

High Performance Option (HPO) Feature: This feature, consisting of the loosely coupled facility and the multiple database function (MDBF), allows the TPF 4.1 system to run in a loosely coupled configuration where each central processing complex (CPC) can share a common database. The HPO feature provides two distinct subfunctions:

- The loosely coupled facility, which allows the TPF 4.1 system to run in a loosely coupled configuration where multiple CPCs can share a common database

- The multiple database function (MDBF), which provides users with the ability to separate multiple databases physically or logically.

The Multi-Processor Interconnect Facility (MPIF) feature is required for this feature.

Multi-Processor Interconnect Facility (MPIF)

Feature: This feature provides an interface that permits TPF CPCs to communicate with each other at a very high speed.

TPF Application Requester (TPFAR) Feature:

This feature allows TPF application programs to read and write data directly to IBM DATABASE 2 (DB2) Version 2 Release 3 or later release. The TPFAR feature supports the IBM Systems Application Architecture (SAA) strategy for database distribution using the remote unit of work method of distributed access. The TPFAR feature implements the requester portion of the Distributed Relational Database Architecture (DRDA), allowing TPF application programmers to send static Structured Query Language (SQL) requests to a remote DB2.

Note: IBM C/370 language support, which was a feature with the TPF 3.1 system, is now included in the base product.

Enhancements to the TPF 4.1 System

The following are the major TPF 4.1 system enhancements:

Transaction Protection and Data Integrity: The TPF 4.1 system separates and isolates information into types of address spaces for system processing and message processing. Through the use of the dynamic address translation (DAT) facility and low address protection, the TPF 4.1 system changes how storage is physically and logically used for system programs, application programs, and messages. The introduction of virtual address spaces in the TPF environment has significantly increased the integrity of the data environment in the TPF 4.1 system. The TPF 4.1 system also

provides the basic tools needed for additional data integrity and recovery.

The TPF 4.1 system provides very high throughput measured by the number of messages per second. A single transaction usually involves several messages and multiple database accesses. The typical TPF 4.1 system processes several hundred messages per second. For even higher throughput, a loosely coupled TPF 4.1 system can process thousands of messages per second. The TPF 4.1 system reaches its high transaction rate, in part, by allowing customers to determine the degree of integrity needed for each system resource and to build their own recovery.

Increased Main Storage for Application

Program Use: By using the TPF 4.1 system, customer application programs benefit from increased access to storage above and below 16MB, while maintaining the 24-bit application program interface (API) for existing TPF system software. The concept of virtual storage replaces the concept of real (main) storage.

Improved System Availability: The TPF 4.1 system provides very high system availability. In many cases, the scheduled availability has exceeded 99.9%, which represents fewer than 10 minutes of downtime per week. Even higher availability can be achieved when TPF central processing complexes (CPCs) are run in a loosely coupled configuration.

By using the TPF 4.1 system, less downtime is needed for software maintenance because customers can dynamically change storage allocation values, add SNA terminals without stopping the network, assign new programs online without reinitializing the system to activate the programs, and change program attributes without reinitializing the system to activate the attributes.

E-Type Loader Enhancements: The E-type loader loads programs while the TPF 4.1 system is in production. The TPF 4.1 system solves the interface problem that occurred during E-type loading in the TPF 3.1 system when there was a window of time in which both old and new versions of a program could be used.

Multiple TPF Images: Multiple TPF images allows customers to define up to 8 images of the TPF system on a single processor. Maintaining multiple and separate TPF images allows customers to integrate program changes more easily by performing loads while the TPF system processes messages without destroying the existing program base, and by providing the ability to fall back immediately to a previous program base without reloading the previous program versions.

Simplified System and Program Allocation:

The system allocation process is simplified using the TPF 4.1 system. The system allocator program (SALO) compiles, link-edits, and runs in one job. Before the TPF 4.1 system, allocation was staged in several jobs.

General Loader Enhancements: User productivity and system management are improved by allowing customers to have more control over loading programs and by removing system allocation restrictions. With the TPF 4.1 system, the number of programs that can be allocated has increased from fewer than 33 000 to more than 1 000 000 programs.

Expanded File Addressing Capacity: The TPF 4.1 system supports two new file addressing formats, FARF4 and FARF5. FARF4 is a migration step between the present FARF3 address scheme and increases the system database addressing capacity from 640 million to approximately 1 billion (2^{30}) records. Migration to FARF5 expands the addressing capacity even more, to approximately 4 billion (2^{32}) records. FARF3 addresses are still supported but cannot coexist with FARF5 addresses.

TPF Advanced Program-to-Program Communications (TPF/APPC) Enhancements:

The TPF 4.1 system includes additional base APPC functions to TPF/APPC support to complete TPF system support of all APPC base functions, including mapped conversations (for the C language interface only) and parallel sessions.

SNA Communications Enhancements: Customers can now install new network definitions without disrupting the network or recycling processors. In addition, customers can write network definitions to tape or general data sets (GDSs).

Diagnostic Tools: Several enhancements were made to the branch trace facility, real-time trace (RTT), online minidump, macro trace, system log trace, Enter/Back trace, I/O trace, register trace, program event recording (PER) facility, path information unit (PIU) trace facility, and SNA I/O trace facility.

System Error Dump Enhancements: Customers can now control the content of a TPF dump. System error options are no longer subsystem-unique and customers can define multiple sets of system error numbers and specify additional main storage areas to be dumped.

Enhanced Tape Support: The TPF 4.1 system provides automatic tape mounting, system detection of lost tape interrupts, and stalled tape module queues. The TPF 4.1 system also supports only 3480 tape and tape control devices.

Migration Aids: The TPF 4.1 system provides migration aids to protect the customer's investment. These aids include the IBM Transaction Processing Facility Migration Guide: TPF 3.1 System to TPF 4.1 System (referred to as the TPF Migration Guide: TPF 3.1 System to TPF 4.1 System in the remainder of this book), IBM Transaction Processing Facility Migration Guide: Program Update Tapes (referred to as the TPF Migration Guide: Program Update Tapes in the remainder of this book), the FARF migration path, virtual-equals-real (VEQR) operating mode, block-checking mode, and multiple TPF images.

Virtual File Access (VFA) Enhancements: To improve performance in the TPF 4.1 system, VFA is always present and active.

System Service Request Enhancements: Enhancements to the macro decoder and supervisor call instruction (SVC) definitions increase the ability of an application program to request system services.

Improved Interprocessor Communications (IPC): Beginning with the TPF 4.1 system, the only supported path for IPC is through the Multi-Processor Interconnect Facility (MPIF) feature.

Performance Monitoring Enhancements: Several reports are enhanced to be more usable and present additional information. A new report contains a histogram of storage frame usage.

Improved System Initialization: System initialization is easier in the TPF 4.1 system. The file address compute program (FACE) table generation is handled by a new offline FACE table generator program rather than as part of the system initialization process (SIP).

Improved Capture and Restore Operations: The capture and restore utility controls the maximum number of simultaneous captures allowed for each tape control unit, DASD control unit, DASD channel path, and tape channel path based on the channel path activity.

Specified Operating Environment

Machine Requirements

The following are the minimum hardware requirements for operating a TPF 4.1 system:

- IBM ESA/370 or IBM ESA/390 for both the production systems and any IBM Virtual Machine (VM) or Processor Resource/Systems Manager (PR/SM)-based test and production facilities
- Eight megabytes (8MB) of main memory (also needed for a test system)

Note: Depending on your TPF system configuration, your results may vary.

- At least 4 tape units and 1 tape control unit
- One DASD control unit
- Two DASD devices
- One system console.

Storage Devices: This section discusses storage devices such as tape units, and DASD and DASD control units.

Tape Units

The TPF 4.1 system supports all models of the following tape units and product features:

- Model 3480 Tape Unit and Model 3480 Control Unit
- Model 3490 Tape Unit and Model 3490 Control Unit.

The preceding tape units and tape control unit models may provide the following product features:

- Improved Data Recording Capability (IDRC) feature

- Automatic Cartridge Loader feature (manual or automatic modes only), which maximizes customer efficiency in automatic tape mounting
- Dual Control Unit Communications Coupler feature
- Multipathing
- IBM 3480 Model 2 XF Format (written and read by 3490E devices)
- IBM Enterprise Systems Connection (ESCON) channel adapter
- Enhanced Capacity Cartridge System Tape
- First-in-first-out (FIFO) control unit buffer recovery.

Notes:

1. The Model 3420 tape unit and associated 3803 control units are no longer supported.
2. The Models 3480 and 3490 tape units need at least a licensed internal code level 991862 (equivalent to A47862).
3. Model 3480 tape units do not support FIFO control unit buffer recovery. Model 3490 tape units require licensed internal code C34668K and Model 3490E tape units require licensed internal code C05568K to support FIFO control unit buffer recovery.

DASD and DASD Control Units

The TPF 4.1 system supports the following DASD and DASD control units:

- IBM 3350 Direct Access Storage Facility (native mode only)
- IBM 3375 Direct Access Storage Facility
- IBM 3380 Direct Access Storage Facility
- IBM 3380 CJ2 Storage Control
- IBM 3390 Models 1, 2, and 3 Direct Access Storage Device (native and emulation modes)
- IBM 3880 Models 1, 2, and 3 Storage Control
- IBM 3880 Model 23 Storage Control with the 8B0035 Record Cache RPQ
- IBM 3990 Models 1 and 2 Storage Control
- IBM 3990 Model 3 Storage Control with the Record Cache Buffer Emulation RPQ (single CPC environment)
- IBM 3990 Model 3 Storage Control with the Record Cache Buffer Emulation RPQ and Limited Lock Facility/Microcode Static Switch RPQ (loosely coupled environment)
- IBM 3990 Model 3 Storage Control with the Record Cache RPQ (single CPC environment)

- IBM 3990 Model 3 Storage Control with the Record Cache and Limited Lock Facility/Microcode Static Switch RPQ (loosely coupled environment)
- IBM 3990 Model 3 Storage Control with the Multi-Path Record Cache RPQ
- IBM 9345 Direct Access Storage Device subsystem, direct attach (single CPC environment)
- IBM 3990 Model 6 with Record Cache and Multi-Path Lock Facility (MPLF).

Note: Models 3880 or 3990 require the limited lock facility (LLF) or the multi-path lock facility (MPLF) when part of a loosely coupled processor complex.

Unit Record Devices

The TPF 4.1 system supports the following unit record devices:

- IBM 4248 Impact Line Printer Model 2 in 3211 emulation mode
- IBM 3505 Card Reader.

Interconnection Devices

The TPF 4.1 system supports the following interconnection devices:

- IBM 3088 Multisystem Channel Communication Unit (all models), which provides for IPC over block multiplexer channels.
- IBM 3737 Remote Channel-to-Channel Unit Model 1, which allows IBM System/390 host systems to communicate with each other through public or private T1 facilities.
- IBM 9032 Enterprise Systems Connection Director (ESCD) Model 2, which provides for connectivity and switching among Enterprise Systems Connection (ESCON) channels and control units. At least one IBM 9032 ESCD Model 2 port should be connected to an IBM MVS/ESA or IBM VM/ESA system for device support.
- IBM 9033 Enterprise Systems Connection Director (ESCD) Model 1, which provides for connectivity and switching among ESCON channels and control units. At least one IBM 9033 ESCD Model 1 port should be connected to an IBM MVS/ESA or IBM VM/ESA system for device support.
- One IBM 9034 ESCON Converter Model 1 attached to 1 I/O device with parallel channel adapters to ESCON channels. Customers can have more than 1 IBM 9034 ESCON Converter

Model to I/O device attachment in the operations center or enterprise.

- IBM 9035 ESCON Converter Model 2, which allows IBM 3990 Model 2 device units with ESCON adapters to be attached to parallel channels. The IBM 9035 provides a migration path to the ESCON architecture environment without modifying the processor or the application software in most cases.

Control Units: The following provides information about the types of control units and devices that the TPF 4.1 system supports.

Communication Control Units

The TPF 4.1 system supports the following communication control units:

- IBM 3705, which is applicable for synchronous link control (SLC) only
- IBM 3725 and IBM 3745, with locally attached VTAM CMC as a prerequisite.

Terminal Interchange and Control Units

The TPF 4.1 system supports the following terminal interchange and control units:

- IBM 1971 Terminal Control Unit
- IBM 2946-4 Terminal Control Subsystem
- IBM 2948 Display Terminal Interface
- IBM 3174 Control Unit Models 1L and 11L
- IBM 3174 Control Unit Model 151R
- IBM 3271 Control Unit Models 11 and 12
- IBM 3274 Control Unit Models 1B and 1C
- IBM 3276 Control Unit/Display Station Models 11 and 12
- IBM 3601, 3602 Finance Communication Controllers with attached devices
- IBM 3614, 3624 Consumer Transaction Facility
- IBM 4700 Finance Communication Controllers with attached devices (the IBM 4700 is supported as a 3600 controller)
- 8100 DSC Information System
- SLU Type P must be a cross-domain resource (includes 3600, 4700, 8100, AS/400, IMS/VS, and CICS/VS).

Note: VTAM CMC is not required for emulation program (EP) support.

Terminals and Display Devices

The TPF 4.1 system supports the following terminals and display devices:

- IBM 1977-1 Terminal Unit
- IBM 1980-21/24 Terminal Printers
- IBM 2915-3 Display Terminal
- IBM 3179-1 Display Station
- IBM 3277 and 3278 Display Station
- IBM 3279 Display Station
- IBM 3290 Display Station, single port
- IBM 3284, 3286, 3287, and 3289 Printers
- IBM 4505 Video Display
- IBM 5150 PC, 5160 XT, 5170 AT
- IBM 5271-3270 PC.

Consoles: The TPF 4.1 system supports the following consoles:

- IBM Extended Operations Console Facility/2 (EOCF/2) channel attached with an IBM MicroChannel to Mainframe Connection (MMC) card for IBM 3215 and 3270 console support
- IBM 3036-1 Console
- IBM 3191 Display Station (with the 4224 Printer)
- IBM 3210-1 Console Printer-Keyboard
- IBM 3215 Console Printer-Keyboard
- IBM 3277 Display Station (with the 328x Printer)
- IBM 3278-IIA Display Station (with the 328x Printer).

Central Processing Complexes (CPCs): The following shows the CPCs that the TPF 4.1 system supports and whether there is loosely coupled processing support for them. If loosely coupled processing is supported and an RPQ is required, that information is also provided.

- IBM 3090 Models 120E, 150E
 - **Loosely Coupled:** No
- IBM 3090 Models 180E, 200E, 280E, 300E, 400E, 500E, 600E
 - **Loosely Coupled:** Yes
 - **Clock Sync Support:** RPQ 8P1189
 - **Channel Redrive Support:** RPQ 8P1189
- IBM ES/3090 Models 110J, 120J, 150J, 170J, 250J
 - **Loosely Coupled:** No
- IBM ES/3090 Models 180J, 200J, 280J, 300J, 380J, 400J, 500J, 600J
 - **Loosely Coupled:** Yes
 - **Clock Synch Support:** RPQ 8P1189; Sysplex Timer (STR)

- **Channel Redrive Support:** RPQ 8P1189; RPQ 8P1441
- IBM ES/3090 Models 170JH, 250JH
 - **Loosely Coupled:** No
- IBM ES/3090 Models 100S, 120S, 150S, 170S, 250S
 - **Loosely Coupled:** No
- IBM ES/3090 Models 180S, 200S, 280S, 300S, 380S, 400S, 500S, 600S
 - **Loosely Coupled:** Yes
 - **Clock Sync Support:** RPQ 8P1189
 - **Channel Redrive Support:** RPQ 8P1189
- IBM ES/3090-9000T Models 15T, 17T, 18T, 25T, 28T
 - **Loosely Coupled:** Yes
 - **Clock Synch Support:** Sysplex Timer (STR)
 - **Channel Redrive Support:** See Note 1.
- IBM ES/9000 9021 Model 330
 - **Loosely Coupled:** Yes
 - **Clock Synch Support:** Sysplex Timer (STR)
 - **Channel Redrive Support:** See Note 1.
- IBM ES/9000 9021 Models 340, 500, 580, 620, 720
 - **Loosely Coupled:** Yes
 - **Clock Sync Support:** RPQ 8P1189; Sysplex Timer (STR)
 - **Channel Redrive Support:** RPQ 8P1189; FC 9593/1593
- IBM ES/9000 9021 Models 520, 640, 660, 711, 740, 820, 821, 822, 831, 860, 900, 941, 942, 952, 962, 972, 982, 9x2
 - **Loosely Coupled:** Yes
 - **Clock Sync Support:** Sysplex Timer (STR)
 - **Channel Redrive Support:** FC 9593/1593
- IBM ES/9000 9121 (All Models)
 - **Loosely Coupled:** Yes
 - **Clock Sync Support:** Sysplex Timer (STR)
 - **Channel Redrive Support:** RPQ 8P1189
- IBM ES/9221 Models 191, 201, 211, 221, 421
 - **Loosely Coupled:** No

Notes:

1. Before adding a system that does not support channel redrive in a loosely coupled complex, I/O configurations and I/O loads should be analyzed to project effective performance.
2. In the previous information, a Yes printed for Loosely Coupled indicates that the CPCs may participate in a loosely coupled processor complex when all required RPQs or feature codes (FC) are installed. A No printed for Loosely Coupled indicates that the required features or RPQs are not available for the CPCs and they cannot participate in a loosely coupled environment.

Requests for Price Quotations (RPQs) and Product Features for CPCs

The following provides a brief description of the RPQs and product features that are required for the various CPCs for the TPF 4.1 system.

- Sysplex Timer (STR): The IBM 9037 Sysplex Timer (STR) is a common time source for clock synchronization across central processing complexes (CPCs). It is part of the IBM Enterprise Systems Connection (ESCON) Architecture.

STR and RPQ 8P1189 are mutually exclusive.

Note: Time-of-Day (TOD) Synchronization Compatibility (TSC) Hardware (RPQ 8K1731) provides the ability to operate the TOD RPQ (RPQ 8P1189) CPCs and STR CPCs in the same loosely coupled complex.
- TOD Clock Sync: This RPQ synchronizes the time-of-day (TOD) clocks in a loosely coupled complex.

Note: TOD Synchronization Compatibility (TSC) Hardware (RPQ 8K1731) is required when there are TOD RPQ (RPQ 8P1189) central processing complexes (CPCs) and Sysplex Timer (STR) CPCs in the same loosely coupled complex.
- 8P1189: For the IBM 3090 and IBM ES/9000 9021 models, the TPF Enabler RPQ provides these functions:
 - Channel Redrive
 - TOD Clock Synchronization.

For the IBM ES/9000 9121 models, the TPF Enabler RPQ provides the Channel Redrive function.

In a loosely coupled environment, when TPF Enabler RPQ 8P1189 is active and multi-pathing is used, the CPC must be an IBM ES/3090 Model S at SEC 852 or later SEC level, an IBM ES/3090 Model J or later model, or an IBM ES/9000 9021 model or 9121 model.

- 8P1269: For the IBM ES/3090 and IBM ES/9000 9021 models, the TPF Enabler RPQ is required to run the TPF 4.1 system on the B side of any processor that can be physically partitioned. RPQ 8P1189 is a prerequisite for this RPQ.

Note: RPQ 8P1269 is not applicable to the IBM ES/9000 9121 models.

- 8P1441: This is the Channel Redrive RPQ for selected models of the IBM ES/3090 Model J.
- 9021 (FC 9593/1593): The TPF ESA (Channel Redrive) Enabler.

Single CPC Environment: See the TPF Migration Guide: TPF 3.1 System to TPF 4.1 System and TPF Migration Guide: Program Update Tapes for a summary of the IBM 3380 and IBM 3390 DASD models that are supported by various control units and RPQs in only a single CPC environment. In addition, see the TPF Migration Guide: TPF 3.1 System to TPF 4.1 System and TPF Migration Guide: Program Update Tapes for information about new installation RPQs.

Loosely Coupled CPC Environment: In a loosely coupled CPC environment for the TPF 4.1 system:

- Clock synchronization is required and can be achieved with any of the following:
 - Transaction Processing RPQ 8P1189
 - Sysplex Timer (STR).
- Channel Redrive is required except where noted in the previous table. Channel Redrive allows the channels to redrive start subchannel (SSCH) instructions that failed because of device or control unit busy conditions. Channel Redrive is recommended for tightly coupled TPF environments to achieve the announced performance.

See the TPF Migration Guide: TPF 3.1 System to TPF 4.1 System and TPF Migration Guide: Program Update Tapes for information about

which IBM 3380 and IBM 3390 models are supported by various control units and RPQs in a loosely coupled complex, as well as information about new installation RPQs.

High Performance Option (HPO) Feature: To run in a loosely coupled complex under the High Performance Option (HPO) feature, Multi-Processor Interconnect Facility inter-processor communications (MPIF IPC) is required because direct access storage device inter-processor communications (DASD IPC) is no longer supported. The hardware needed is a Model 3088 or IBM Enterprise Systems Connection (ESCON) Channel-to-Channel (CTC).

Programming Requirements

This section contains information about the minimum software requirements necessary for operating the TPF 4.1 system:

- Either IBM MVS/XA or IBM MVS/ESA systems is required for offline batch and utility functions.
- High Level Assembler/MVS (HLASM; 5696-234) is required for TPF 4.1 program assemblies.
- The PL/1 Optimizing Compiler & Libraries (5688-910) is required for compilation of TPF 4.1 data reduction, offline pool utilities, and directory generation programs.
- An IBM MVS/ACF/VTAM Version 4 Release 2 system or later release is required when using the 3745 Communications Controller.
- A Communications Management Configuration with an IBM ACF/VTAM Version 4 Release 2 system (or later release) at a release level compatible with the ACF/NCP used to provide peripheral host node (Type 2.1) services or gateway services is required.
- The following C language products are supported:
 - IBM C/370 Compiler and Library Version 2 Release 1 or later release
 - IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2 or later release
 - IBM SAA AD/Cycle Language Environment (LE/370) Version 1 Release 3 or later release.
- IBM VTAM CMC (required for 3745), at least IBM VTAM Version 4 Release 2 or later release, and IBM NCP Version 7 Release 1 or later release are required.

Operating Environment for SNA-Based Communication: For Systems Network Architecture (SNA)-based communication with remote users (terminal and application programs) in the same or other networks, the TPF 4.1 system requires a channel-attached IBM 3745 Communications Controller. Channel-to-channel (CTC) or Enterprise Systems Connection (ESCON) CTC can also be used for host-to-host communication. A TPF 4.1 processor can define up to 255 channel-attached 3745 Communication Controllers.

The following software levels are supported for communication controllers:

- On a local IBM 3745 Communications Controller for other than peripheral host node communications (SNA Type 5):
 - IBM ACF/NCP Version 7 Release 1 or later release
 - IBM ACF/NCP Version 7 Release 1 or later release with the Airlines Line Control Interconnection (ALCI) feature. ALCI requires that the 3745 be equipped with the appropriate RPQs and Licensed Internal Code (LIC) level for Airlines Line Control attachment. See the 3745 ACF/NCP RPQs by Protocol information that follows.
 - IBM NPSI Version 3 Release 7 or later release with NCP Version 7 Release 1 or later release.
- Remote IBM 3745 Communications Controller running any supported release of ACF/NCP.

The specified software levels are required for communication controllers in the IBM VTAM Version 4 Release 2 (or later release) environment running LU 6.2 in a PU 2.1 environment:

- In an SNA 3745 support and Communications Management Configuration for peripheral host node (Type 2.1), IBM ACF/VTAM Version 4 Release 2 or later release is required to communicate with the TPF 4.1 system through an NCP supporting peripheral host node attachment (IBM NCP Version 7 Release 1 or later release).
- For a nonperipheral host node, IBM ACF/VTAM Version 4 Release 2 or later release can be either channel-attached or link-attached to the TPF 4.1 system. The attachment is made through the services of an SNA network interconnection gateway provided

by IBM ACF/NCP Version 7 Release 1 or later release.

Operating Environment for Non-SNA-Based Communication: To use the bisynchronous communications (BSC) protocol, a 3745 partitioned emulation program (PEP) and emulation program (EP) Version 6 Release 1 or later release with IBM NCP Version 7 Release 1 or later release is required.

To use the synchronous link control (SLC) protocol, the emulation program (EP Version 3 Release 1) in the 3705 Communication Controller is required.

RPQs By Protocol: This section provides information about RPQs, by protocol, that are supported for the following:

- 3705 EP/VS (for synchronous data link control (SLC) only)
- 3720 ACF/NCP
- 3725 ACF/NCP/VS
- 3745 ACF/NCP.

3705 EP/VS RPQs by Protocol

The following 3705 EP/VS RPQs are supported for the synchronous link control (SLC) protocol:

- Link Control FDX IATA PRPQ 85027; one for each 3705 (3705-I only)
- 3705 feature 1541 or 1544 Channel Adapter, Type 1 or 4 only
- 3705 feature 1642, Communication Scanner Type 2 only
- 3705 feature 4714 or 4718, Line Set Type 1D or 1H, one for each FDX line.

3720 ACF/NCP RPQs by Protocol

The following 3720 ACF/NCP RPQs are supported for the Airlines Line Control (ALC) protocol:

- RPQ 7L1095
- LC Expansion Unit 5971-L02.

3725 ACF/NCP/VS RPQs by Protocol

The following 3725 ACF/NCP/VS RPQs are supported for the Airlines Line Control (ALC) protocol:

- PRPQ 5799-CDX NEF2
- RPQs 8Q0407 and 8Q0408
- IBM 3725 Communications Controller.

3745 ACF/NCP RPQs by Protocol

The following 3745 ACF/NCP RPQs are supported for the Airlines Line Control (ALC) protocol:

- RPQ 7L1092
- ALC Scanner.

IBM Extended Operations Console Facility/2 (EOCF/2) and IBM Transaction Processing Facility Database Facility (TPFDF): This section contains the minimum software requirements for using IBM Extended Operations Console Facility/2 (EOCF/2) and IBM Transaction Processing Facility Database Facility (TPFDF) products with the TPF 4.1 system:

- For the EOCF/2 product, you must have the EOCF/2 Corrective Service Diskette 2 (CSD2) or later release installed. CSD2 supports IBM Operating System/2 (OS/2) Version 2.1 as well as the new message formats for the TPF 4.1 system.
- For the TPFDF product, you must have program update tape (PUT) 02 or later release installed.
- For the Distributed Data Access (DDA) feature of the TPFDF product, you must have authorized program analysis report (APAR) PN49945 installed.

Licensed Program Materials Availability

Restricted materials — Yes. This licensed program is available with source licensed program materials for some modules designated as "RESTRICTED MATERIALS OF IBM." In addition, some modules are available without source licensed program materials. These modules are available in object code. The remaining modules are available with source licensed program materials. The source code is produced in high-level assembler language, in PL/1, or in IBM C language.

Supplemental Terms

Designated Machine Identification

Designated Machine Identification Required: Yes.

Testing Period

Basic License: Two months

Installation/Location License

Not applicable. A separate license is required for each machine on which the licensed program materials will be used.

Usage Restriction

Not applicable.

Type/Duration of Program Services

Central service is available until discontinued by IBM with a minimum of 6 months written notice.

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Additional Supplemental Terms

Program-Unique Terms: The TPF 4.1 system (the "Program") contains several components, some of which are provided by third party suppliers to IBM ("Third Party Software Code"). The Program and certain components of the Program have Program-unique terms which are identified below, and which apply to the Program or the referenced component of the Program in addition to, or, as the case may be, in place of the terms and conditions of the IBM International Customer Agreement ("Agreement"). Program components may only be used within the Program environment.

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- File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP), and the fork Function

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- Expression enhancements for the TPF debuggers

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