



FeatureFlex™
Technical Overview

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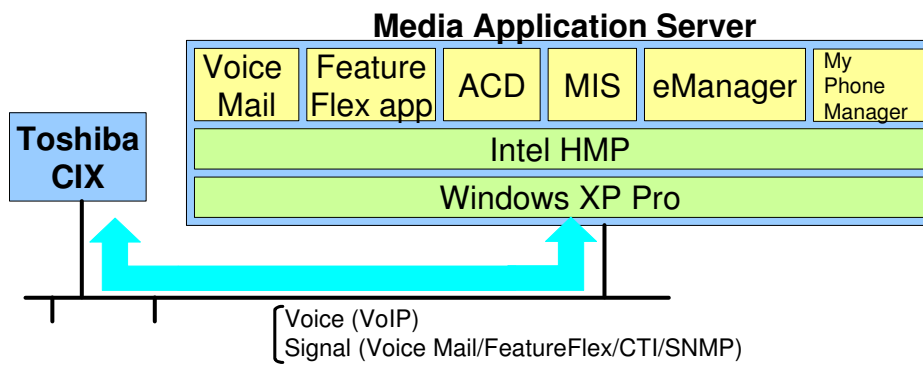
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1. FEATUREFLEX OVERVIEW

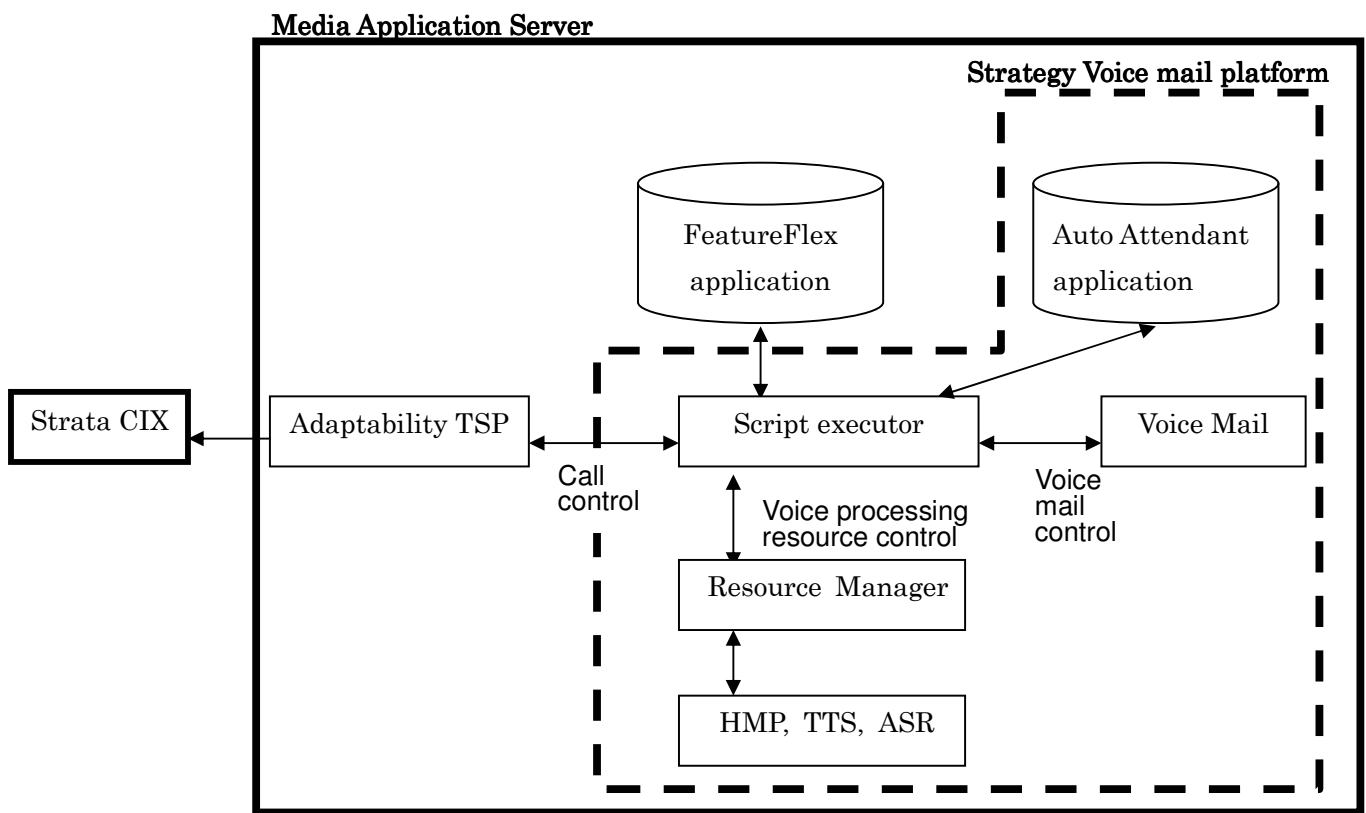
Strata CIX FeatureFlex (FF) provides a means of extending the features of the Strata telephone system. The extensions, called “FeatureFlex Applications,” include the ability to respond to events such as: incoming calls; the use of voice processing resources for voice, fax, speech recognition, and text-to-speech; and the ability to do both call and phone control.

FeatureFlex is provided on the Media Application Server (MAS), an integrated VoIP platform for Strata CIX IP communication system. MAS hosts a variety of applications including eManager (administration application), My Phone Manager (personal administration application), ACD, MIS and Stratagy ES voice mail system.



FeatureFlex uses the Strategy voice mail platform as the foundation of voice processing and as a script execution engine; therefore, Strategy must be present on the MAS to run FeatureFlex applications.

FeatureFlex application runs on Script executor and access the various capabilities provided by MAS and the Strata CIX switch.



2. FeatureFlex Applications

2.1 Examples of Applications

FeatureFlex applications have been created by Toshiba, authorized dealers, customers, and developers to provide customers with solutions. The following gives some of the applications developed using FeatureFlex, and will give you an idea as to what kind of applications are feasible using FeatureFlex capabilities.

One Number Access: allows the caller to reach the user wherever the user may be. When the call comes to the published number, the call is intercepted by the FeatureFlex application that makes a call sequentially to destinations on the list by controlling the voice port.

Call Screen: provides the user with the choice to either accept or reject the call, depending on the caller. When a call comes to the user, the call is intercepted by the FeatureFlex application that checks the caller ID against the pre-determined list. If the caller is in the “accept” list, the call is routed to the phone by the FeatureFlex call control capability. If the call is listed in the reject list, the call is routed to the voice mail.

Call Monitor: allows the user to listen to the caller leaving a voice message and then, to either connect to the caller immediately and talk in real time or let the caller leave a message so that the user can listen to it at a later time. The Call Monitor button, which generates an event to the FeatureFlex application, triggers it using the call control capability to make a bridge call between the caller leaving a message and the user.

Call Return: allows the user to immediately return the call when the user is accessing his/her voice mail by using the call control capability of the FeatureFlex. After the returned call is over, an event is sent to the application so that it can connect the user to the voice mail at the position where the user left off and continue listening to the messages.

Alarm Clock: provides a simple alarm clock function on the phone. When the alarm time comes, the FeatureFlex application is activated and makes a call to the user for the alarm announcement using the call control and voice processing control capability of FeatureFlex. The application can also display the text on the phone using the FeatureFlex phone control capability.

2.2 Application Appropriateness

FeatureFlex offers the extensive capabilities that integrate call control and voice processing in the industry standard Tool Command Language (TCL) scripting environment. Based on its characteristics and capabilities, there are applications that are best implemented by FeatureFlex as well as those that may be better to be developed by other development interfaces and environment. Here are some examples on both categories.

FeatureFlex is appropriate when the application needs to:

- be launched when a programmable key is pressed on a phone.
- be launched before a call is delivered to a prime DN.
- divert a call from one phone to another.
- play or record audio files.
- play prompts, times, dates, numbers, alphanumeric strings, or quantities of money.
- collect digits from a caller.
- display short messages to the user on the phone LCD.
- change the color and flash rate of a phone LED.
- look up information on a web site.
- send an email message.
- set parameters for the caller's voice mail.
- place an outbound call.
- distinguish between a person and an answering machine when placing an outbound call.
- set up two calls to separate voice processing ports, and then connects the two callers, dropping out the voice processing ports.
- perform a periodic action to display information, place a call, or update a database.
- recognize what a caller says.
- convert text information into speech and play it to a caller.
- access to a directory of company personnel via Active Directory.
- load extra TCL commands for integration with an enterprise database.

FeatureFlex Technical Overview

FeatureFlex functions and the supporting tools are being enhanced to further extend the range of applications supported by FeatureFlex. However, FeatureFlex may not be appropriate at this moment when the application needs to

- run on the platform other than Strategy ES.
- be launched when a telephone user goes off hook.
- be launched when a call arrives on a particular trunk circuit or trunk group.
- be launched when a call is placed on a particular trunk or trunk group.
- be launched just before a call is delivered to an ACD queue.
- be launched just before a call is delivered to a phantom DN.
- send or receive fax messages.
- modify existing SES Voice Mail user interfaces.
- change eManager or My Phone Manager.
- change the behavior of a telephone's line key.
- use softkeys on the desk phone.
- display more than 24 characters of message on the desk phone.
- modify the way CIX hunting works.
- change the way ACD handles calls.
- change the programming of the Strata CIX.
- play messages from a voice mailbox.
- simulate button presses on a phone.
- use complex parameters and needs a special management interface that is not possible using either a TUI interface or My Phone Manager's generic FeatureFlex

3. FeatureFlex Development Environment

3.1 Development Environment

FeatureFlex is based on the industry standard TCL scripting language. Since it is a scripting language, it is relatively easy to create small applications. It also allows interaction with external applications that may be implemented by the programming language, such as C++.

Toshiba uses TCL as the basis of the programming environment and add primitives to allow applications to receive triggers and control the call and voice processing resource to provide new and advanced applications. The following shows an example of TCL script for a FeatureFlex application.

```
# -----
# UniqueGreetings/bcd.TCL
# This code executes in Context 1 on a before call delivery trigger.
# Based on Caller ID, it selects important callers for routing to the desk
# phone, then on no answer, to a cell phone. Other callers are simply
# sent to the phone for normal termination.
# -----
set phoneanswer 0
set phonebadparam 1
set phonebadstatus 2
set phonebusy 3
set phonednd 4
set phonerna 5
set phonefwd 7

# Get the trigger information, and look up the phone's user agent
array set trig $sca_trigger
set ua [sca_getUaForDn $trig(pdn)]
set path $sys_TCL_library_path/bf/UniqueGreetings

# Using the time of day and day of week, set the call destination.
array set uaprop [lrange [GetUA $ua UGCallers UGDestination] 3 end]
array set greetings $uaprop(UGCallers)
set to $trig(pdn)

# Get the VM member DNs, using the configuration Line* variables
# These must be treated as friends to allow transfers from VM to work.
set VMLines {}
foreach line [info var Line*] {
    set linedn [lindex [set $line] 0]
    if {$linedn != {}} {lappend VMLines $linedn} }
# Get the caller ID
if {[llength $trig(extra)] == 1} {
    set origin [lindex $trig(extra) 0]
} else {
    set origin [lindex $trig(extra) 1] }
set app Direct
```

```
if {[info exists sys_voicemail_pilot_number] && [info exists greetings($origin)]} {
    # Caller is an important caller so give special handling
    set app Special }

if {[string compare $app Special] == 0} {
    if {$uaprop(UGDestination) == {}} {
        set uaprop(UGDestination) $trig(pdn) }
    # Send the call to the deskphone destination, using simple termination
    catch {sca_terminateCall $trig(pdn) $trig(transaction) Z $uaprop(UGDestination) 1 10} phonestatus
    if {$phonestatus != $phoneanswer} {
        # No answer or other bad status, so send to VM.
        set ugrt ${systemdatabase}$ua/$greetings($origin)
        if [catch {is_valid_file $ugrt}] {
            # Greeting file doesn't exist, so just do VM
            set script "set_hook off; Run Record"
        } else {
            set script "set_hook off; cg_playFile $ugrt; Run Record" }
        if {[catch {sca_storeApp TCL $script $ua} app]} {
            catch {sca_terminateCall $trig(pdn) $trig(transaction) $app
$sys_voicemail_pilot_number 0 8} err
        } else {
            catch {sca_endTransaction $trig(transaction)} err } }
    } else {
        # Not an known caller, so route the call to the default phone
        catch {sca_endTransaction $trig(transaction)} err }
```

3.2 Resource

TCL resource can be obtained by the following web site. It is required to go through the “Getting Started/Tutorials section” on www.TCL.tk to become a FeatureFlex application developer.

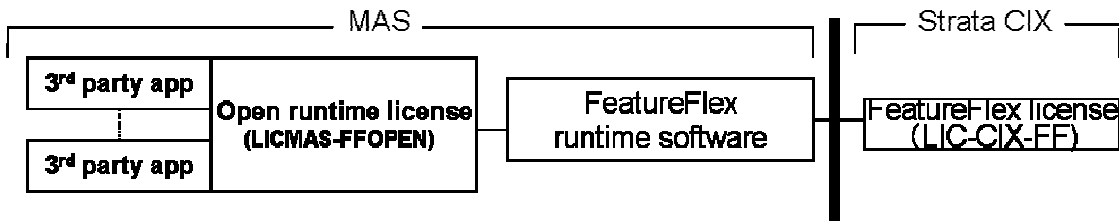
In addition to the web page, the following books are available and recommended to create applications using TCL.

- TCL and the Tk Toolkit, 1994, Ousterhout
- Practical Programming in TCL and Tk (4th Edition), 2003, Welch et al
- The Complete TCL/Tk Training Course, 1998, Welch and Zeltserman
- TCL/Tk: A Developer's Guide, 2003, Flynt

4. FeatureFlex Licensing

The FeatureFlex application involves several licenses to run on the particular MAS system.

The following chart shows the license component on the MAS and Strata CIX system.



4.1 Runtime Licensing

FeatureFlex requires an open run-time license to be installed in the MAS to run the encrypted and plain text applications. The open run time license is available from Toshiba.

4.2 Application License

The application license is controlled by developers. Toshiba provides the standard license model that allows a developer to encrypt the application scripts to protect it from being copied without permission from the developer. To execute the script, FeatureFlex will require a license that is keyed with the MAC address of the MAS system. Toshiba provides the developer with the licensing tool to control the application license as a part of the Application Developer Program.

4.2.1 Site Licensing

Once the application is encrypted and distributed, the license is necessary for the FeatureFlex runtime environment to execute the application. If the license is applied, the application can run on that particular MAS system only.

4.2.2 Feature Licensing

In addition to enabling or disabling the application by the license, the licensing tool includes additional data that can be used by the application to limit the functionality within the application and/or the number of entities that the application can support.

Examples of how to use this additional data include, limiting the:

- number of phones that can be configured to use a particular feature.
- number of concurrent instances of a feature.
- dates when the feature is allowed to run, for example to provide demonstration licenses.

4.2.3 License Tool

Two licensing tools are provided for the developer subscribing to the Application Developer Program. The encryption tool can encrypt the FeatureFlex script application so that it cannot be copied to another MAS system that is not licensed. The license generation tool can generate the license for the particular application that the developer created to run on the specified MAS system only.

5. FeatureFlex Capabilities

FeatureFlex provides developers with the integrated functions of call control and voice processing. The following shows the list of capabilities to support those functions in the TCL environment. The detailed information is described in the FeatureFlex SDK document available to developers who subscribe to Toshiba Application Developer Network program.

[Voice Resource]

FeatureFlex has following capabilities to control the voice port on the MAS. Separate voice resource licenses may be required.

- *Play beep tone or the file*
- *Record audio input from the line into the file*
- *Terminate the play back and recording operation*
- *Collect DTMF digits*
- *Wait for asynchronous play back or recording*
- *Speak date, time, currency, number, character*
- *Play the system prompt identified by number.*

[Fax Resource]

FeatureFlex has following FAX capabilities. Separate voice resource licenses or hardware may be required.

- *Queue a list of files (Tiff-F or ASCII Text) to be sent to a list of phone numbers or user agents*
- *Receive or transmit a fax over the existing call.*

[First Party Call Control]

FeatureFlex has following call control capabilities for the voice port on the MAS.

- *Dial dial-string.*
- *Put current line on hold or un-hold.*
- *Allocate or free a line to/from a session that was running without one.*
- *Go off-hook or on-hook state.*
- *Answer or disconnect a call.*

[Third Party Call Control]

FeatureFlex has following call control capabilities for the device and call in the system.

- *Make a call from a phone device to a specified destination*

- *Route an incoming call to a particular destination.*
- *Tear down a call that is in progress.*
- *Return the control of the call to the switch that was processed by FeatureFlex application*

[Telephone Control]

FeatureFlex has following phone control capabilities.

- *Control of the LCD display on a telephone to show a short message.*
- *Set the color and flash rate of an LED on the telephone.*

[Program Execution]

FeatureFlex has following execution control capabilities for programs running on the MAS.

- *Suspend current thread of execution for a time period.*
- *Contact an active directory server, and retrieve a list of entries.*
- *Run a native media server application*
- *This command stops the voice resource running on another session.*
- *Creates a session to send a TCL command for execution or terminate a session*
- *Check the existence of a session*
- *Create an internal Script Executor application along with all the necessary parameters.*
- *Provide a mechanism for executing encrypted TCL scripts.*
- *Provide TCL scripts with a way to serialize access to shared resources in the system.*
- *Trigger an event for a given user agent.*

[Configuration and System Information]

FeatureFlex has following capabilities for system information or configuration.

- *Set or remove a variable from the system configuration, but only for the current session.*
- *Get a list of variables, or set or delete a variable in the global interpreter.*
- *Get ID for the currently executing session or line object*
- *Get a list of user agents or get the properties of the user agent*
- *Check a user agent's security code*
- *Set, retrieve, or delete a session property.*
- *Check if native media server application exists.*
- *Check if a date has been configured as a holiday*
- *Set or look up a prime DN and the associated user agent*
- *Enable or disable FeatureFlex triggers for a telephone*
- *Tell the current session what to do when no activity is requested*

- *Shut down the Windows operating system.*

[Log and Trace]

FeatureFlex has following logging capabilities.

- *Log an error message, an info message, or a warning message*
- *Add a trace message to the media server's trace output.*

[Application Licensing]

FeatureFlex has following application license capability.

- *Retrieve the quantity of the license that is associated with the specified feature.*

[Text to Speech]

FeatureFlex has following TTS capabilities. Separate voice resource licenses may be required.

- *Allocate or release TTS channel resource.*
- *Speak the text from the file or any null terminated ASCII string*

[Speech Recognition]

FeatureFlex has a rich set of ASR capabilities. Separate voice resource licenses may be required. Here is a short summary of the primary capabilities:

- *Recognize an item from a list. This is useful for directory operations such as automated attendant.*
- *Recognize an answer to a yes/no question.*
- *Recognize a date.*
- *Recognize a number such as phone number or Social Security Number, .*
- *Recognize a name (using a large database of names used in the US).*
- *Recognize an amount of money.*
- *Recognize an alphanumeric string spelled by the user.*
- *Recognize alternate pronunciations.*
- *Recognize synonyms.*
- *Confirm what the user said based on a recognition confidence score.*
- *Deal with multiple meanings for the same words via disambiguation.*
- *Allow the user to barge-in while prompts are still playing.*
- *Record users' speech to allow debugging of recognition logic.*
- *Recognize a custom grammar, such as an English sentence, and spot key words in the sentence.*

6. Developer Program

Developers are welcomed to join Toshiba Application Developer Network (TAD-NET) program to become FeatureFlex application developers. The program provides developers with the SDK document and tool, sample codes, training, and technical support necessary to create new FeatureFlex applications easily and efficiently.

The program also includes other application development tools such as Microsoft TAPI. For details, please refer to “Toshiba Application Developer Program” document available on www.toshiba.com/taistsd/developer.