Advanced Java Application
Development for the BlackBerry
Smartphone

BlackBerry Academic Program
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Chapter 6
Understanding push technology

Objectives

- Describe the methods available to push content to BlackBerry® smartphones
- Describe client/server push versus browser push
- Describe RIM push versus PAP push

This chapter outlines the methods available to push content to BlackBerry smartphones, describes the differences between the two underlying technologies, RIM push and PAP push, and describes the differences between client/server push and browser push.
Push technology

Push applications send web content or other data to BlackBerry smartphones. Users do not need to request or download the data because the push application delivers the information as soon as it becomes available. When the server pushes information to the BlackBerry smartphone, the phone notifies the user by vibrating, changing an icon on the screen, or turning on a light.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>immediacy</td>
<td>Pushing data to a BlackBerry smartphone is the most efficient way to get information to BlackBerry smartphone users. Data is delivered to applications on the BlackBerry smartphone as soon as it becomes available.</td>
</tr>
<tr>
<td>efficiency</td>
<td>Applications need not poll servers for new data, reducing bandwidth consumption.</td>
</tr>
<tr>
<td>reduced latency</td>
<td>Applications that use push can reduce the impact on network latency, because data is delivered to BlackBerry smartphones in the background without user involvement. The most recent data is available on the BlackBerry smartphone when the BlackBerry smartphone user opens the application.</td>
</tr>
<tr>
<td>longer battery life</td>
<td>Push applications can extend battery life. Instead of actively checking for new data, push applications listen in the background for data to arrive.</td>
</tr>
<tr>
<td>shorter learning curve</td>
<td>BlackBerry smartphone users do not need to learn a procedure to access pushed content. For developers, much of the complexity of a push data delivery service is handled by the BlackBerry® Infrastructure.</td>
</tr>
</tbody>
</table>

Client/server push versus browser push

Browser push applications send web content to the web browser on the BlackBerry smartphone. Browser push applications do not require a separate client application on the BlackBerry smartphone.

Client/server push applications send data from a server-side application to a custom client application on the BlackBerry smartphone. Client/server push requires a custom client application on the BlackBerry smartphone. This approach permits more control than browser push applications over the type of content, and how the BlackBerry smartphone processes and displays the content.
BlackBerry MDS Connection Service administration

The BlackBerry MDS Connection Service controls the flow of data that is sent to the BlackBerry smartphone. This flow control permits the BlackBerry MDS Connection Service to minimize the amount of data that is sent over the wireless network, and can help to reduce the impact of pushing data to BlackBerry smartphones that are out of network coverage, turned off, or otherwise unavailable.

The BlackBerry MDS Connection Service sends a series of packets to each BlackBerry smartphone specified in the push request. The BlackBerry MDS Connection Service initially sends a maximum of five packets, and does not send additional packets until the BlackBerry smartphone acknowledges receipt of the packets.

The default limit on the size of packets is 29 KB for BlackBerry Enterprise Server version 4.0, or 1 KB for BlackBerry Enterprise Server version 4.1 or later.

If the BlackBerry MDS Connection Service cannot immediately deliver packets to a BlackBerry smartphone (for example, because the BlackBerry smartphone is outside a network coverage area or is turned off), then the packets are queued, and the BlackBerry MDS Connection Service attempts to resend them later. If the BlackBerry MDS Connection Service cannot deliver the packets before the flow control counter expires, then the packets are removed from the queue, and the push request is considered unsuccessful for the given BlackBerry smartphone. The default value of the flow control counter is 10 minutes.

BlackBerry Enterprise Server administrators can change the default size of the data packets and the default flow control counter, which can impact the performance of the BlackBerry MDS Connection Service.

<table>
<thead>
<tr>
<th>Changed value</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>increase the default size of the data packets</td>
<td>BlackBerry MDS Connection Service uses more memory to store the packets in the queue.</td>
</tr>
<tr>
<td>increase the flow control counter</td>
<td>Push requests are queued in memory longer.</td>
</tr>
</tbody>
</table>

The BlackBerry Enterprise Server administrator limits the number of queued push connections. The longer a push request remains in the queue, the more likely it is that the BlackBerry MDS Connection Service runs out of available push connections, and denies new push requests.

Administrators can configure the storage settings for push requests that are stored in the BlackBerry Configuration Database, including the maximum number and the maximum age of push requests stored in the database. Consider developing standards within your organization for these configuration settings.
1. Which of the following characterizes push technology? Choose one.
   A. BlackBerry smartphone users can request data updates whenever they need them.
   B. BlackBerry smartphone users do not need to request updates because the BlackBerry smartphone repeatedly polls the server for new data.
   C. BlackBerry smartphones listen for updates in the background without user intervention.

2. Which of the following support pushed content delivery? Choose one.
   A. WAP network gateways
   B. BlackBerry Internet Service Browsing network gateway
   C. The BlackBerry MDS Connection Service
   D. All of the above
   E. None of the above

3. What does the BlackBerry MDS Connection Service control?
   A. Log on permissions
   B. The flow of data
   C. The MDS push speed

4. What happens if the packets sent by the BlackBerry MDS Connection Service cannot be delivered immediately? Choose all that apply.
   A. the packets bounce back
   B. the packets are deleted
   C. the packets are queued
   D. the system initiates a query
Answers

1. C
2. D
3. B
4. C and D
Browser push

Browser push applications send web content to the web browser on the BlackBerry smartphone. Browser push applications do not require a separate client application on the BlackBerry smartphone.

Pushing web content to BlackBerry smartphones

The BlackBerry® Browser supports several push options; you can specify which option to use by using an HTTP header. You can use additional HTTP headers that are specific to a browser push application to control how the content appears to the user. These browser-specific headers are in addition to the PAP control entity or RIM push headers that are part of every push request.

<table>
<thead>
<tr>
<th>Request type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>browser channel</td>
<td>Pushes content to the browser cache and adds an icon on the Home screen of the BlackBerry smartphone as an entry point to the content. When the smartphone user clicks the icon, the BlackBerry Browser opens and displays the pushed content. The browser channel remains on the Home screen of the BlackBerry smartphone until deleted. The BlackBerry smartphone user can delete the channel, or you can send a channel delete request to delete the channel for the user.</td>
</tr>
<tr>
<td>browser channel delete</td>
<td>Removes a channel from the recipient BlackBerry smartphones. This request includes no content, only headers, which inform the BlackBerry smartphone to delete the specified channel and remove the icon from the Home screen.</td>
</tr>
<tr>
<td>browser message</td>
<td>Delivers content to the message list, where it appears as an item in the list. When the BlackBerry smartphone user clicks the item in the message list, the BlackBerry Browser opens and displays the pushed content.</td>
</tr>
<tr>
<td>browser cache</td>
<td>Delivers content directly to the browser cache, but provides no notification to the user. The next time the user attempts to access the associated web address, the browser retrieves and displays the updated content from the cache.</td>
</tr>
</tbody>
</table>

Pushing content to a browser channel

Your server-side application can push content to the BlackBerry smartphone to create or update browser channels. A browser channel is an alternative entry point to the BlackBerry Browser application...
that loads pushed content (instead of the user-defined home page) when the user opens the BlackBerry Browser. Browser channels appear to the user as an icon on the Home screen of the BlackBerry smartphone. When the user clicks the icon, the BlackBerry Browser opens and pulls the content from the pushed content cache.

You must uniquely identify a browser channel by using a channel ID, specified by the X-Rim-Push-Channel-ID header. If a channel with the same channel ID already exists on the BlackBerry smartphone, the new content replaces the existing content. The channel ID identifies the channel in channel delete requests or delete notifications sent when the user deletes the channel.

A browser channel can have two icons associated with it.
- one to indicate that new content is available on the BlackBerry smartphone (the unread icon)
- one to indicate that the latest content has already been viewed (the read icon)

When the BlackBerry Browser receives content that the server has pushed to a channel, the BlackBerry smartphone creates a new channel, or updates the channel if the specified channel ID already exists.

When a channel is added or updated, the unread icon appears on the Home screen of the BlackBerry smartphone. For example, the icon for an order-tracking channel can change when new product orders appear in the system. After the user clicks the icon and views the updated content, the read icon appears on the Home screen of the BlackBerry smartphone, and remains until new content is delivered for that channel.

Store the icons for your application on your web server and specify the web addresses for each icon in the push request by using the X-Rim-Push-Unread-Icon and X-Rim-Push-Read-Icon headers. When the BlackBerry MDS Connection Service receives a browser channel push request, it retrieves the icons from the specified locations and delivers them to the BlackBerry smartphone along with the pushed content. If you do not include these headers, the BlackBerry smartphone uses the icons that you specified in a previous push request associated with that channel ID, if they exist, or the system default icon if they do not.

**To push to a browser channel**

For the X-Rim-Push-Type header, specify a value of browser-channel.

You must also include the X-Rim-Push-Channel-ID header to specify a unique identifier for the channel.

You can optionally include one or more of the following HTTP headers:
- X-Rim-Push-Title, which specifies a title used to identify the push application on the Home screen of the BlackBerry smartphone.
- X-Rim-Push-Unread-Icon-URL, which specifies the web address for the unread icon.
- X-Rim-Push-Read-Icon-URL, which specifies the web address for the read icon.
- X-Rim-Push-Delete-URL, which specifies the web address to which notifications are sent if the user deletes the channel from the Home screen of the BlackBerry smartphone.
Deleting a browser channel from the BlackBerry smartphone

Browser channel icons remain on the Home screen of the BlackBerry smartphone until deleted.

- The server-side push application can submit a browser channel delete request to delete the browser channel.
- The user can delete the browser channel manually.

The icon that is associated with the browser channel icon disappears from the Home screen of the BlackBerry smartphone, and the associated content is cleared from the pushed content cache.

Submitting a channel delete request

You can remove a browser channel from a BlackBerry smartphone at any time. This can be useful when any of the following conditions apply:

- a push service is obsolete
- data is to be available only during a specific time period
- a user no longer needs to receive data pushed to a given browser channel

A channel delete request deletes only the instance of the specified browser channel that is currently stored on the BlackBerry smartphone. If the server pushes content to that browser channel again, the channel is reopened, and the icon reappears on the Home screen of the BlackBerry smartphone.

To delete a browser channel

For the X-Rim-Push-Type header, specify a value of browser-channel-delete, and include the X-Rim-Push-Channel-ID header to indicate which channel to delete.

Requesting notification when a user deletes a browser channel

When a user deletes an icon from the Home screen of the BlackBerry smartphone, most push applications automatically remove that user from the list of recipients for future push requests. Optionally, you can construct your push request so that the service administrator receives a notification when the user deletes the browser channel. The service administrator can then decide whether to remove the user from the list of recipients.

You can include the X-Rim-Push-Delete-URL to specify a web address to which a notification is sent when the user deletes the channel. When the user deletes a browser channel, the browser sends a GET request to the specified web address. The web address is not opened for the user to view; instead, the BlackBerry smartphone retrieves the web address in the background, and automatically notifies the push originator that the channel no longer exists on the smartphone.

When the browser sends the GET request to the web address, it does not supply any parameters describing the channel being deleted. You must add parameters to the web address so that you can uniquely identify the push when the web address is requested.
Pushing content to the messages application

Your server-side application can push content pages to the messages application on the BlackBerry smartphone. A browser message push request can include a descriptive title, which appears as the subject of the message in the messages application. Otherwise, the browser message displays the web address of the associated content as the subject of the message. Users can click on the message in the messages application to open the BlackBerry Browser and view the content.

When you push content to the messages application, the server stores the pushed content in the browser message item, not in the BlackBerry Browser push content cache. When the BlackBerry smartphone user deletes the message, the pushed content is deleted with it. When a browser message arrives on the BlackBerry smartphone, a notification icon appears in the BlackBerry smartphone banner. If the user has configured it to do so, the BlackBerry smartphone issues an alert. By default, the BlackBerry smartphone provides no notification when a browser message arrives.

To push content to the messages application

For the X-Rim-Push-Type header, specify a value of browser-message.

You can also choose to include the X-Rim-Push-Title header, which specifies a title used as the subject of the message when it appears in the messages application.

Pushing content to the browser cache

Your server-side application can push content directly to the BlackBerry Browser cache. The user receives no notification indicating that new content is available, but the next time that the user visits the specified web address, the browser retrieves the content from the cache.

You can use browser cache push requests in conjunction with browser channel push requests or browser message push requests to preload the cache with external resources, such as images or style sheets, that are referenced by other pushed content but are not included. If you push these resources to the cache, smartphones can display the content quickly, even if they are not connected to a wireless or Wi-Fi* network. Otherwise, the BlackBerry Browser must make an HTTP request to retrieve referenced resources from the server, which reduces the benefit of a push application.

You can include the X-Rim-Push-Channel-ID header with a browser cache push to associate the cached content with an existing browser channel. For example, if you specify a channel identifier in the request, when the server pushes the content to the cache, it adds the web address of the content to the appropriate channel (if the channel is already active on the smartphone).
To push to the BlackBerry Browser cache

For the X-Rim-Push-Type header, specify a value of browser-content.

You can optionally include the X-Rim-Push-channel-ID header, which specifies the channel ID of the browser channel with which to associate the content.

Considerations when pushing content to the BlackBerry Browser

This section describes cache control, transcoding, and HTTP headers you can use with Push applications.

Defining cache control properties

When you push content to the BlackBerry Browser, the length of time that the content remains in the pushed content cache varies based on the version of the BlackBerry® Device Software a BlackBerry smartphone is running. The following default values apply:

- In BlackBerry Device Software version 3.7 or earlier, the BlackBerry Browser clears the cache after 29 days.
- In BlackBerry Device Software version 3.8 or later, the BlackBerry Browser clears the cache after 12 hours.
- In BlackBerry Device Software version 4.2 or later, if the content web address has a query, the content is not cached.

The BlackBerryBrowser clears expired content from the pushed content cache, even if the user has not viewed it.

You can use the Cache-Control or Expires caching directive to increase or decrease the amount of time the content is stored. The BlackBerry Browser respects any caching directives included with pushed content, whether specified in the content header, or within HTML <meta> tags.

Using the Cache-Control header, you can use the max-age control to specify the number of seconds before cached content expires.

Cache-Control: max-age=3600

Using the Expires header, you can specify an explicit date and time, in HTTP format, at which the content expires.

Expires: Wed, 07 Oct 2010 08:00:00 GMT
If you use the `Cache-Control` header, you define a static value, because the expiration time is relative to the time the BlackBerry MDS Connection Service pushed the content. If you use the `Expires` header, you define the value as a variable and set it appropriately with each push request.

If you are pushing static resources directly to the cache (such as a style sheet, or an image that is unlikely to change) it is better to use the `Expires` header, so that you can specify an expiry date that is far into the future.

### Transcoding content

You can configure the BlackBerry MDS Connection Service to automatically transcode pushed content before it sends it to the BlackBerry Browser. When the BlackBerry MDS Connection Service transcodes content, it changes the pushed resources into formats that are more suitable for sending over the wireless network and for rendering in the BlackBerry Browser.

Push requests can override the transcoding rules configured for the BlackBerry MDS Connection Service using the `X-Rim-Transcode-Content` header. You can use this header to specify a list of MIME types that the BlackBerry MDS Connection Service transcodes. For example, if the HTTP header `X-Rim-Transcode-Content: application/xhtml+xml` is set, then the BlackBerry MDS Connection Service transcodes XHTML content before pushing it to the BlackBerry smartphones.

You can also specify a value of `none` to prevent the BlackBerry MDS Connection Service from transcoding any content. For best results, use a value of `*/*`, which permits the BlackBerry MDS Connection Service to transcode all your content.

Although most often used with browser content, you can use the `X-Rim-Transcode-Content` header in conjunction with a BlackBerry Java Application, if a transcoder exists on the BlackBerry MDS Connection Service for the data format you are sending.

### HTTP headers used by the BlackBerry Browser

If you push content to the BlackBerry Browser, you must include push headers that define the browser behavior when it receives the pushed content, in addition to whatever delivery parameters you specified in the PAP control entity or RIM push headers. For example, you can specify whether the content is delivered to the messages application or to a browser channel, and optionally specify web addresses for icons.

When you use the PAP push format, include the browser headers in the content portion of the multipart message. When using the RIM push format, add the headers to the RIM push headers included in the HTTP POST request.
When the BlackBerry MDS Connection Service encounters the browser push headers, it forwards these headers to the BlackBerry smartphone unchanged.

<table>
<thead>
<tr>
<th>Header</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-Rim-Push-Type</td>
<td>Specifies the browser push type. This header is required for all browser push requests. This header can have any of the following values:</td>
</tr>
<tr>
<td></td>
<td>• browser-channel: Pushes content to the Home screen of the BlackBerry smartphone, where it is added as an icon. When the user clicks the icon, the browser opens and displays the pushed content.</td>
</tr>
<tr>
<td></td>
<td>If you specify this value, you must also specify a channel ID using the following headers to specify icon images to use on the Home screen of the BlackBerry smartphone: X-Rim-Channel-ID header. X-Rim-Push-Read-Icon-URL X-Rim-Push-Unread-Icon-URL</td>
</tr>
<tr>
<td></td>
<td>If the specified channel ID already exists, that channel is updated with the new content.</td>
</tr>
<tr>
<td></td>
<td>• browser-channel-delete: Deletes an existing channel. If you specify this option, you must also specify a channel ID using the X-Rim-Channel-ID header. The browser deletes the channel with the given channel ID.</td>
</tr>
<tr>
<td></td>
<td>• browser-content: Pushes content directly to the browser pushed content cache. The next time that the user visits the specified web address, the browser retrieves the updated content from the cache.</td>
</tr>
<tr>
<td></td>
<td>• browser-message: Pushes content to the message list, where the message is identified as a browser message.</td>
</tr>
<tr>
<td>X-Rim-Push-Title</td>
<td>Specifies a text string that is used to identify the push application on the Home screen, in the message list, or in the browser bookmarks.</td>
</tr>
<tr>
<td>X-Rim-Push-Channel-ID</td>
<td>Specifies a string that uniquely identifies a new or existing channel. This header is required when X-Rim-Push-Type has a value of browser-channel or browser-channel-delete. Optional when X-Rim-Push-Type has a value of browser-content.</td>
</tr>
<tr>
<td>Header</td>
<td>Description</td>
</tr>
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<td>------------------------------</td>
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</tr>
<tr>
<td>X-Rim-Push-Read-Icon-URL</td>
<td>Specifies the web address of the icon image that is used to identify the push application on the Home screen of the BlackBerry smartphone after the BlackBerry smartphone user has viewed the content.</td>
</tr>
<tr>
<td></td>
<td>The BlackBerry MDS Connection Service retrieves the image from the specified web address and delivers it to the recipients along with the pushed content.</td>
</tr>
<tr>
<td></td>
<td><strong>This header is valid only when X-Rim-Push-Type has a value of browser-channel.</strong></td>
</tr>
<tr>
<td>X-RIM-Push-Unread-Icon-URL</td>
<td>Specifies the web address of the icon image that is used to identify the push application on the Home screen of the BlackBerry smartphone before the BlackBerry smartphone user has viewed the content.</td>
</tr>
<tr>
<td></td>
<td>The BlackBerry MDS Connection Service retrieves the image from the specified web address and delivers it to the recipients along with the pushed content.</td>
</tr>
<tr>
<td></td>
<td><strong>This header is valid only when X-Rim-Push-Type has a value of browser-channel.</strong></td>
</tr>
<tr>
<td>X-RIM-Push-Delete-URL</td>
<td>Specifies a web address that the BlackBerry Browser retrieves when the user deletes the channel from the Home screen of the BlackBerry smartphone. The browser retrieves the web address in the background. By retrieving the web address, the BlackBerry smartphone notifies the push originator that the channel has been deleted from the BlackBerry smartphone.</td>
</tr>
<tr>
<td></td>
<td>The BlackBerry Browser does not add any parameters to the specified web address. You must therefore include parameters to uniquely identify the push when the web address is requested.</td>
</tr>
<tr>
<td></td>
<td><strong>This header is valid only when X-Rim-Push-Type has a value of browser-channel.</strong></td>
</tr>
</tbody>
</table>
Additional HTTP headers you can use with browser pushes

When pushing content to the BlackBerry Browser, you can optionally include the following headers to define additional controls for the content:

<table>
<thead>
<tr>
<th>Header</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expires</td>
<td>Specifies an explicit date and time, in HTTP format, at which the content expires.</td>
</tr>
<tr>
<td></td>
<td>expires: Wed, 07 Oct 2010 08:00:00 GMT</td>
</tr>
<tr>
<td></td>
<td>If you use the Cache-Control: max-age directive, you do not normally require the Expires header.</td>
</tr>
<tr>
<td>Cache-Control</td>
<td>Specifies the caching directive for the pushed content. Use the max-age control to specify the time, in seconds, before the cached content expires.</td>
</tr>
<tr>
<td></td>
<td>Cache-Control: max-age=3600</td>
</tr>
<tr>
<td></td>
<td>If you use the Expires header, you do not normally require the Cache-Control: max-age directive.</td>
</tr>
<tr>
<td>X-Rim-Transcode-Content</td>
<td>Specifies which types of pushed content the server transcodes.</td>
</tr>
<tr>
<td></td>
<td>This header can have any of the following values:</td>
</tr>
<tr>
<td></td>
<td>• <em>/</em>: Prompts the BlackBerry MDS Connection Service to transcode all content for which it has a transcoder. If you do not specify the X-Rim-Transcode-Content header, the BlackBerry MDS Connection Service transcodes all content.</td>
</tr>
<tr>
<td></td>
<td>• none: Forces the BlackBerry MDS Connection Service to send all content to the BlackBerry Browser without transcoding it.</td>
</tr>
<tr>
<td></td>
<td>• list_of_MIME_types: Specifies a comma-separated list of MIME types which the BlackBerry MDS Connection Service transcodes before sending the content to the BlackBerry smartphone.</td>
</tr>
<tr>
<td>Content-Location</td>
<td>Specifies the web address location from which the content is downloaded, if the content is not included with the push message.</td>
</tr>
</tbody>
</table>
1. Which of the following sends two icons as part of the push? Choose one
   A. Browser channel push
   B. Browser channel delete push
   C. Browser content cache push
   D. Browser message push

2. What are the two icon discussed in question 1?
   A. unread icon—indicates that new content is available
   B. expired icon—indicates that the content is expired
   C. loading icon—indicates that the content is not fully downloaded
   D. read icon—indicates that the latest content has already been viewed

3. Which of the following sends no icons as part of the push? Choose 2 or more.
   A. Browser channel push
   B. Browser channel delete push
   C. Browser content cache push
   D. Browser message push

4. Content can be pushed only to the BlackBerry Browser. True or false?
Answers

1. A

2. A, D

3. B, C, D

4. False. You can also push messages to the Messages application on a BlackBerry smartphone.
RIM push and PAP push

You can use either RIM push or PAP push to send data to BlackBerry smartphones. The BlackBerry MDS Connection Service can queue up to 1000 push requests, including both RIM and PAP push requests. A push request is made up of the data to be pushed and delivery parameters that define how, when, and to whom the data is pushed.

Both the PAP push and RIM push formats support the following features:

- Reliable push requests: Requests that the BlackBerry MDS Connection Service send a result notification to indicate the success or failure of the push request for each recipient address.
- Deliver-After time stamp: Specifies the \textit{beginning} of the period of time when the push can be delivered.
- Deliver-Before time stamp: Specifies the \textit{end} of the period of time when the push can be delivered. If the BlackBerry MDS Connection Service cannot deliver the data by the specified time, the push request is considered to have failed.

The PAP push service implementation supports the following additional features:

- Push cancellation: Enables push applications to cancel a push submission that has already been sent.
- Push status query: Enables push applications to check the status of a push submission.

If you are pushing data to the BlackBerry Browser, you must specify additional browser push HTTP headers in addition to the delivery parameters.

The principle difference between the RIM push and PAP push is the way the delivery parameters are specified:

- The RIM push protocol sends the content as a byte stream to the destination BlackBerry smartphone at the port specified in the web address of the pushed message. You can store content in RAM on the BlackBerry MDS Connection Service server or in the BlackBerry Enterprise Server database. The RIM push format is a proprietary push format supported exclusively by the BlackBerry MDS Connection Service and BlackBerry smartphone.
- PAP push sends an HTTP POST request containing a PAP message. The BlackBerry MDS Connection Service supports the WAP PAP version 2.0 standard, and sends a MIME multipart message that includes the control entity and the pushed content. The control entity is an XML document that specifies information about the destination BlackBerry smartphone address, message ID, and delivery time stamps. The PAP push format is an open standard developed by the Open Mobile Alliance.
1. Which of the following permits your application to cancel a push request submission? Choose one.
   A. RIM push
   B. PAP push

2. Which of the following uses an XML document to specify the push request submission? Choose one.
   A. RIM push
   B. PAP push

3. Which two features are supported by PAP but not RIM push?
   A. Push Cancellation
   B. Push status query
   C. Delivery-before stamp
   D. Delivery-after stamp
Answers

1. B
2. B
3. A, B
Summary

Push applications send web content or other data to specific BlackBerry smartphones. Users need not request or download the data because the push application delivers the information as soon as it becomes available. The BlackBerry smartphone does not poll the server to look for updates.

The RIM push protocol sends the content as a byte stream to the destination BlackBerry smartphone. Pushed data can be stored in RAM on the BlackBerry MDS Connection Service server or in the BlackBerry Enterprise Server database. The PAP protocol sends an HTTP POST request containing a PAP message. The message is a MIME multipart message that includes the control entity and the pushed content. The control entity is an XML document that specifies information about the destination BlackBerry smartphone address, message ID, and delivery time stamps.

- Browser push applications send web content to a web browser on the BlackBerry smartphone. Browser push does not require a separate client application on the BlackBerry smartphone.
- Client/server push applications send data from a server application to a custom client application on the BlackBerry smartphone. Client/server push requires a custom client application on the BlackBerry smartphone.
1. Describe the function of push applications.

2. Discuss the difference between Browser push and client/server push applications.

3. What purpose does a browser channel serve?

4. What are the two ways to delete a Browser channel?

5. What does transcoding content do?

6. Describe the difference between RIM push format and PAP push format.