In-App Purchases and Using Server-to-Server Notifications

Dana DuBois, App Store Engineering Manager
Tori Shurman, App Store Commerce Engineer
Manjeet Chawla, App Store Commerce
What’s new in StoreKit
Server-to-server notifications
Subscription lifecycle
Reducing involuntary churn
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Introduced in iOS 12.2, tvOS 12.2, macOS 10.14.4
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Retaining and winning back subscribers
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<tr>
<th>Subscription Offers Best Practices</th>
<th>Friday, 2:00</th>
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<tr>
<td>In-App Purchases and Subscriptions Lab</td>
<td>Friday, 3:00</td>
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</table>
SKStorefront
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Present the right content to your customers
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Exposes the region that the App Store is currently set to
SKStorefront

Present the right content to your customers

Exposes the region that the App Store is currently set to

Device specific and can change over time
// Getting the storefront

import StoreKit
import os.log

if let sf = SKPaymentQueue.default().storefront {
    os_log("Storefront ISO 3 Country Code: %@", sf.countryCode)
}"}
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if let sf = SKPaymentQueue.default().storefront {
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if let sf = SKPaymentQueue.default().storefront {
    os_log("Storefront ISO 3 Country Code: %@", sf.countryCode)
}
// Using the storefront

func shouldShow(_ productIdentifier: String, in storefront: SKStorefront) -> Bool {
    var rv = true
    //myProducts is a dictionary representing your own metadata for products
    //keyed on an SKProduct.productIdentifier
    if let myProduct = myProducts[productIdentifier] {
        rv = myProduct.countryCodes.contains(storefront.countryCode)
    }
    return rv
}
// Using the storefront

func shouldShow(_ productIdentifier: String, in storefront: SKStorefront) -> Bool {
    var rv = true

    // myProducts is a dictionary representing your own metadata for products
    // keyed on an SKProduct.productIdentifier
    if let myProduct = myProducts[productIdentifier] {
        rv = myProduct.countries.contains(storefront.countryCode)
    }

    return rv
}
// Using the storefront (cont.)

func fetchProductInfo() {

    var identifiers = Set<String>()
    if let storefront = SKPaymentQueue.default().storefront {
        for (identifier, _) in myProducts {
            if shouldShow(identifier, in: storefront) {
                identifiers.insert(identifier)
            }
        }
    }

    let request = SKProductsRequest(productIdentifiers: identifiers)
    request.delegate = self
    request.start()
}
}
// Listening for storefront changes

//MARK: - SKPaymentTransactionObserver methods

func paymentQueueDidChangeStorefront(_ queue: SKPaymentQueue) {
    if let storefront = queue.storefront {
        //refresh the displayed products based on the new storefront
        for product in storeProducts {
            if shouldShow(product.productIdentifier, in: storefront) {
                //display this product in your store UI
            }
        }
    }
}
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    }
}
// Responding to storefront changes during purchase

SKPaymentQueue.default().delegate = self // set your object as the SKPaymentQueue delegate

// MARK: - SKPaymentQueueDelegate methods

func paymentQueue(_ paymentQueue: SKPaymentQueue,
                shouldContinue transaction: SKPaymentTransaction,
                in newStorefront: SKStorefront) -> Bool {
    return shouldShow(transaction.payment.productIdentifier, in: newStorefront)
}
// Responding to storefront changes during purchase

SKPaymentQueue.default().delegate = self // set your object as the SKPaymentQueue delegate

// MARK: - SKPaymentQueueDelegate methods
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func paymentQueue(_ paymentQueue: SKPaymentQueue, 
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    in newStorefront: SKStorefront) -> Bool {
    return shouldShow(transaction.payment.productIdentifier, in: newStorefront)
}
// Responding to storefront changes during purchase

//MARK: - SKPaymentTransactionObserver methods

func paymentQueue(_ queue: SKPaymentQueue, updatedTransactions transactions: [SKPaymentTransaction]) {
    for transaction in transactions {
        if let transactionError = transaction.error as NSError? {
            if transactionError.domain == SKErrorDomain
                && transactionError.code == SKError.storeProductNotAvailable.rawValue {
                //Show an alert
            }
        }
    }
}
// Responding to storefront changes during purchase

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App Pre-Orders
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Introduced in iOS 11.2, tvOS 11.2, and macOS 10.13.2
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Now available in the Watch App Store with watchOS 6.0
App Pre-Orders

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Now available in the Watch App Store with watchOS 6.0

Coming Soon available in the receipt
Server-to-Server Notifications

Tori Shurman, App Store Commerce Engineer
What Are Server-to-Server Notifications?
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HTTP POST with a JSON body
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HTTP POST with a JSON body

Previously known as statusUpdateNotifications
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Return a 200 response from your endpoint to indicate a received message
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HTTP POST with a JSON body

Previously known as statusUpdateNotifications

Return a 200 response from your endpoint to indicate a received message

Will retry up to three times
Setting Up Your Endpoint

![App Store Connect Interface](image-url)

**App Information**

This information is used for all platforms of this app. Any changes will be released with your next app version.

**Localizable Information**

- **Subtitle**: Optional
- **Apple TV Privacy Policy**: Apple is committed to your privacy. Read our customer Privacy Policy for a clear explanation of how we collect, use, disclose, transfer, and store your information.

**General Information**

- **Bundle ID**: com.mc2.ustechlc
- **SKU**: Forest Explorer
- **Apple ID**: 12734021831
- **Primary Language**: English
- **Category**: Entertainment
- **License Agreement**: Edit Custom
- **Rating**: Ages 4+ Additional Ratings
- **Subscription Status URL**: [url]

![Image of App Store Connect](image-url)
Setting Up Your Endpoint
Setting Up Your Server
Setting Up Your Server

The connection must be App Transport Security (ATS) compliant
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Certificate issued by a trusted certificate authority
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TLS 1.2
Setting Up Your Server

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Use the AES-128 or AES-256 symmetric cipher
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The connection must be App Transport Security (ATS) compliant
Certificate issued by a trusted certificate authority
TLS 1.2
Use the AES-128 or AES-256 symmetric cipher
Signed and hashed using SHA-256 or greater
What’s New with Server-to-Server Notifications
Unified Receipt

Contains the history of in-app purchases
Unified Receipt

Contains the history of in-app purchases

Previously, only available through /verifyReceipt
Unified Receipt

Contains the history of in-app purchases

Previously, only available through `/verifyReceipt`

New field in notification
Unified Receipt

Contains the history of in-app purchases

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• unified_receipt
Unified Receipt

Contains the history of in-app purchases

Previously, only available through `/verifyReceipt`

New field in notification

- `unified_receipt`

`latest_receipt` and `latest_receipt_info` no longer needed
Not tied to a specific install of an app
Not tied to a specific install of an app
Should always be stored on your server
Unified Receipt

Contents

unified_receipt_info contents
Unified Receipt

Contents

unified_receipt_info contents

- latest_receipt
Unified Receipt

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unified_receipt_info contents

• latest_receipt
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Unified Receipt

Contents

unified_receipt_info contents

• latest_receipt
• latest_receipt_info
• pending_renewal_info
Unified Receipt

Contents

unified_receipt_info contents

• latest_receipt
• latest_receipt_info
• pending_renewal_info
• status
Unified Receipt
Contents

unified_receipt_info contents

• latest_receipt
• latest_receipt_info
• pending_renewal_info
• status
• environment
Unified Receipt

Contents

unified_receipt_info contents

- latest_receipt
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- pending_renewal_info
- status
- environment

Limited to the 100 latest In App Purchases
Notification Types
Notification Types

- INITIAL_BUY
- INTERACTIVE_RENEWAL
- DID_CHANGE_RENEWAL_PREF
- CANCEL
- DID_CHANGE_RENEWAL_STATUS
- DID_FAIL_TO_RENEW
- DID_RECOVER
- PRICE_INCREASE_CONSENT
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- DID_RECOVER
- PRICE_INCREASE_CONSENT
- NEW
New Notification Types
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<td>DID_CHANGE_RENEWAL_STATUS</td>
<td>Auto-renew toggled on/off</td>
<td></td>
<td>Now</td>
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<td>Notification Type</td>
<td>Meaning</td>
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<td>Available Date</td>
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<td>Auto-renew fails at first attempt to renew</td>
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<td>DID_RECOVER</td>
<td>Subscription recovered in billing retry</td>
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<tr>
<td>PRICE_INCREASE_CONSENT</td>
<td>User has entered a price increase flow</td>
<td>price_increase_effective_date</td>
<td>Fall 2019</td>
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</table>
Handling Notifications
Existing Notification Type Overview
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<table>
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                                        |                                                  | `original_transaction_id`                       |
|                                   |                                                 | `web_order_line_item_id`                           |
| INTERACTIVE_RENEWAL               | A subscription is renewed in the foreground     | `purchase_date`  
<pre><code>                                    |                                                  | `original_transaction_id`                       |
</code></pre>
<p>|                                   |                                                 | <code>web_order_line_item_id</code>                           | <code>product_id</code>                                    |
| DID_CHANGE_RENEWAL_PREF           | A customer downgrades                           | <code>auto_renew_product_id</code>                            | <code>original_transaction_id</code>                       |</p>
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<td>CANCEL</td>
<td>Customer support issues a refund</td>
<td>original_transaction_id</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cancellation_date</td>
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A Subscription is First Purchased

INITIAL_BUY
A Subscription is First Purchased

INITIAL_BUY

Provide service for a newly purchased subscription
A Subscription is First Purchased

INITIAL_BUY

Provide service for a newly purchased subscription

Update the customer’s subscription status accordingly
A Subscription is First Purchased
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<td>latest_receipt_info</td>
<td>1559930400</td>
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<td>latest_receipt_info</td>
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<td>product_id</td>
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<td>latest_receipt_info</td>
<td>my-subscription</td>
<td>Exact product customer has subscribed to</td>
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Renewal in the Foreground
INTERACTIVE_RENEWAL
Renewal in the Foreground

INTERACTIVE_RENEWAL

A customer upgrades — INTERACTIVE_RENEWAL + CANCEL
Renewal in the Foreground
INTERACTIVE_RENEWAL

A customer upgrades — INTERACTIVE_RENEWAL + CANCEL

A customer resubscribes after churn — only INTERACTIVE_RENEWAL
Renewal in the Foreground
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A customer upgrades — **INTERACTIVE_RENEWAL + CANCEL**

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<td>my-subscription</td>
<td>Product the customer upgraded/resubscribed to</td>
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Subscription Downgrade
DID_CHANGE_RENEWAL_PREF
Subscription Downgrade
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Update customer’s subscription to a lower tier
Subscription Downgrade
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Update customer’s subscription to a lower tier

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Customer cancels through customer support — CANCEL
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New Notification Type Overview
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<td>PRICE_INCREASE_CONSENT</td>
<td>The customer enters a price increase flow</td>
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Auto-Renew Status Change
DID_CHANGE_RENEWAL_STATUS
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Update customer’s subscription status to reflect changes
Auto-Renew Status Change
DID_CHANGE_RENEWAL_STATUS

Update customer’s subscription status to reflect changes

Deploy retention strategies
Auto-Renew Status Change
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Update customer’s subscription status to reflect changes

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<td>Product whose auto-renew status changed</td>
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Auto-Renew Fails at First Attempt to Renew
DID_FAIL_TO_RENEW
Auto-Renew Fails at First Attempt to Renew
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Optionally choose to suspend service
Auto-Renew Fails at First Attempt to Renew

DID_FAIL_TO_RENEW

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Update customer’s subscription status to “inactive” or “billing-retry”
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DID_RECOVER
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Replaces existing RENEWAL notification
Subscription Recovered in Billing Retry
DID_RECOVER

Replaces existing **RENEWAL** notification

Restore service for a recovered subscription
Subscription Recovered in Billing Retry

DID_RECOVER

Replaces existing RENEWAL notification

Restore service for a recovered subscription

Update customer’s subscription status to “active”
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Restore service for a recovered subscription

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<td>1234567</td>
<td>Unique identifier for subscription</td>
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Subscription Recovered in Billing Retry
DID_RECOVER

Replaces existing RENEWAL notification

Restore service for a recovered subscription

Update customer’s subscription status to “active”

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Type</th>
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<th>Example Value</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>purchase_date_ms</td>
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<td>1559930400</td>
<td>Date of recovery</td>
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<tr>
<td>original_transaction_id</td>
<td>String</td>
<td>latest_receipt_info</td>
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<td>Unique identifier for subscription</td>
</tr>
<tr>
<td>expires_date_ms</td>
<td>String</td>
<td>latest_receipt_info</td>
<td>1559930400</td>
<td>Date new subscription will expire</td>
</tr>
</tbody>
</table>
Customer Enters a Price Increase Flow

PRICE_INCREASE_CONSENT
Customer Enters a Price Increase Flow

PRICE_INCREASE_CONSENT

Update user’s status to ”price increase”
Customer Enters a Price Increase Flow

PRICE_INCREASE_CONSENT

Update user’s status to “price increase”

Deploy in-app messaging
Customer Enters a Price Increase Flow
PRICE_INCREASE_CONSENT

Update user’s status to “price increase”

Deploy in-app messaging

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PRICE_INCREASE_CONSENT

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Deploy in-app messaging

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<td>0 or 1, default 0</td>
<td>1 if the customer has already consented, 0 otherwise</td>
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Customer Enters a Price Increase Flow

PRICE_INCREASE_CONSENT

Update user’s status to “price increase”

Deploy in-app messaging

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PRICE_INCREASE_CONSENT

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Deploy in-app messaging

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Subscription Lifecycle

Manjeet Chawla, App Store Commerce
Subscription Lifecycle
Subscription Lifecycle

Acquisition
Subscription Lifecycle

- Acquisition
- Engagement
Subscription Lifecycle

Acquisition

Retention

Engagement
Subscription Billing Events

Acquisition

Retention

Engagement
Purchase
Purchase
Purchase

App Store

{ notification_type: "INITIAL_BUY", ... }

Your Server
Purchase

{ notification_type: "INITIAL_BUY", ... }

App Store

/verifyReceipt

Your Server
Purchase

App Store

/verifyReceipt

Your Server

{ notification_type: "INITIAL_BUY", ... }

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Renewal
Renewal

App Store

Your Server

Renewal
Renewal

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## Renewal

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Upgrade

App Store

Your Server
Upgrade

App Store

Upgrade

Your Server
Upgrade

App Store

{ notification_type: "CANCEL", ... }

Your Server
Upgrade

App Store

{ notification_type: "CANCEL", ... }

Your Server

<table>
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<th>isSubscribed</th>
<th>willAutoRenew</th>
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Upgrade

App Store

{ notification_type: "INTERACTIVE_RENEWAL", ... }
Upgrade

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{ notification_type: "INTERACTIVE_RENEWAL", ... }
Upgrade

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{ notification_type: "INTERACTIVE_RENEWAL", ... }
Cancel

App Store

/verifyReceipt

Your Server

Cancel
{ notification_type: "DID_CHANGE_RENEWAL_STATUS", ... }
cancel

app store

your server

{ notification_type: "DID_CHANGE_RENEWAL_STATUS", ... }

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Churn

App Store

Your Server
<table>
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<td>com.product.premium</td>
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</table>
Win Back
Using Subscription Offers

Churn
Win Back
Using Subscription Offers

Subscription Offers Best Practices  Friday, 2:00

In-App Purchases and Subscriptions Lab  Friday, 3:00
Billing Error

App Store

Your Server

Billing Error

1111 2222 3333 4444
Billing Error

{ notification_type: "DID_FAIL_TO_RENEW", ... }
## Billing Error

### Notification

```json
{ notification_type: "DID_FAIL_TO_RENEW", ... }
```

### User Details

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<th>userId</th>
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Billing Error

userId | originalTransactionId | latestExpiresDate | isSubscribed | willAutoRenew | subscriptionProductID
--- | --- | --- | --- | --- | ---
90000001 | 1133557799 | 2019-07-01... | FALSE | TRUE | com.product.premium

{ notification_type: "DID_FAIL_TO_RENEW", ... }
Billing Retry

- App Store
- Your Server
Billing Retry

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<tr>
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{ notification_type: "DID_RECOVER", ... }

Recovery

Your Server

App Store
Billing Retry

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{ notification_type: "DID_RECOVER", ... }
Reducing Involuntary Churn
Billing Retry

Extended failed payment logic
Billing Retry

Extended failed payment logic

Updated retry strategies

Billing Error

1111 2222 3333 4444
Billing Retry

Extended failed payment logic

Updated retry strategies

ML models
Billing Retry

Performance
Billing Retry

Performance

- Recovery Rate:
  - 2017: 40%
  - 2019: 77.4%

- Involuntary Churn:
  - 2017: 5.1%
  - 2019: 1.6%
46 Million

Subscriptions recovered
Recovery Rate

Cumulative Recovery % vs Recovery Days

- 0%
- 16%
- 32%
- 48%
- 64%
- 80%

Recovery Days:
- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45
- 50
- 55
- 60

Cumulative Recovery:
- 77%
Recovery Rate

- Cumulative Recovery %
  - 0%
  - 16%
  - 32%
  - 48%
  - 64%
  - 80%

- Recovery Days
  - 0
  - 5
  - 10
  - 15
  - 20
  - 25
  - 30
  - 35
  - 40
  - 45
  - 50
  - 55
  - 60

80% Recoveries

77%
Recovery Rate

Upon recovery

- Service is re-enabled
Recovery Rate

Upon recovery

- Service is re-enabled
- Subscription has a new billing cycle
Recovery Rate

Upon recovery
- Service is re-enabled
- Subscription has a new billing cycle
- Days of paid service resumes
Billing Grace Period

Overview
Billing Grace Period

Overview

Starting this Fall, you will be able to offer a billing grace period, which allows
Billing Grace Period

Overview

Starting this Fall, you will be able to offer a billing grace period, which allows

• Subscribers to retain access
Billing Grace Period

Overview

Starting this Fall, you will be able to offer a billing grace period, which allows

• Subscribers to retain access

• Developers to earn additional revenue
Billing Grace Period
Implementation
Billing Grace Period
Implementation

1. Opt-in via App Store Connect
Billing Grace Period

Implementation

1. Opt-in via App Store Connect

2. New field in `/verifyReceipt` - `grace_period_expires_date`
Billing Grace Period

Implementation

1. Opt-in via App Store Connect
2. New field in `/verifyReceipt` – `grace_period_expires_date`
3. Keep service active during grace period
Billing Grace Period

Benefits
Billing Grace Period

Benefits

No service interruption for customers
Billing Grace Period

Benefits

No service interruption for customers

Billing cycle continuity for recoveries made within grace period
Billing Grace Period

Benefits

No service interruption for customers

Billing cycle continuity for recoveries made within grace period

Revenue for service provided during grace period
Billing Grace Period

Benefits

No service interruption for customers

Billing cycle continuity for recoveries made within grace period

Revenue for service provided during grace period

Faster accumulation of days of paid service towards 85/15 revenue share
Billing Retry
Customer messaging
Billing Retry
Customer messaging
Billing Retry

Customer messaging

There was an issue with your current payment method. Please update it to keep access to Premium.

Don’t worry, you still have access to Premium for 15 days

Update now
Billing Retry
Customer messaging

There was an issue with your current payment method. Please update it to keep access to Premium.

Don’t worry, you still have access to Premium for 15 days

Update now
Billing Grace Period
Customer messaging

Edit billing information — apps.apple.com/account/billing
### Manage Payments

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Your default payment method is at the top. Tap Edit to re-order or remove payment methods.

**SHIPPING ADDRESS**

John Appleseed
1 Infinite Loop, Cupertino, CA 95014, United States
Summary
Summary

Reduce voluntary churn by using Subscription Offers
Summary

Reduce voluntary churn by using Subscription Offers

Implement SKStorefront to show the right content to the customer
Summary

Reduce voluntary churn by using Subscription Offers

Implement SKStorefront to show the right content to the customer

Identify customers who pre-ordered your app
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Use server-to-server notifications and respond to billing events

Provide a billing grace period

Show contextual messaging inside the app
More Information

developer.apple.com/wwdc19/302

<table>
<thead>
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<th>Event</th>
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<tr>
<td>In-App Purchases and Subscriptions Lab</td>
<td>Friday, 3:00</td>
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