From: Eric Friedman ([redacted])
To: Raj Ramamurthy ([redacted]) Trystan Kosmynka ([redacted]) Ritwik Kumar ([redacted]) Jeremy Stober ([redacted])
CC:
BCC:
Subject: virus scanner abuse
Attachments: AMP Virus Scanner Abuse - EF.key; smime.p7s;
Sent: 06/29/2017 12:49:57 PM 0000 (GMT)

Collaboration gave up on me last night, so I had to edit locally. Please send feedback as you can. Trystan especially, call out any misstatements. I'm just summarizing and not trying to speak for you now or in the ERB.

Jeremy, if you see mitigations we should propose, please do. If you see mitigations we think are not realistic, let's not put them out there. External campaigns is a hard one — Figaro reversing would yield poor results.

Idea: can you please rank order the mitigations from most=>least effective? That would be something worth closing with.

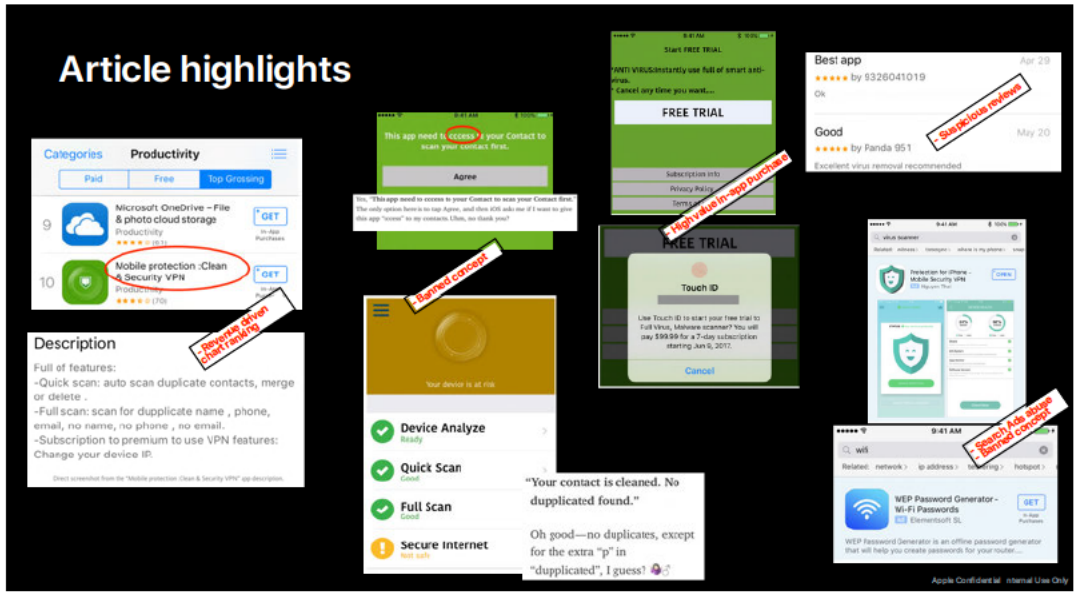
Raj, after this group looks at it, we need to push it past iAds. I don't know what they are realistically going to do.

App Store abuse case study

A retrospective on https://medium.com/@johnnylin/how-to-make-80-000-per-month-on-the-apple-app-store-bdb943862e88

Agenda

- Summarize issues raised by the article
- Map these to current and future work across store functions
  - Discovery
  - Content quality & pricing
  - Search Ads

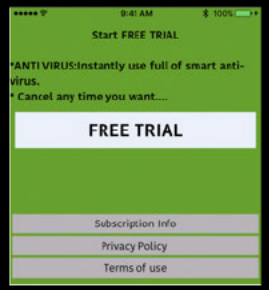

Article highlights
Categories
Productivity
Paid
Free
Top Grossing
Microsoft OneDrive – File & photo cloud storage
Mobile protection :Clean & Security VPN
Revenue driven chart ranking
Description
Full of features:
-Quick scan: auto scan duplicate contacts, merge or delete .
-Full scan: scan for dupplicate name , phone, email, no name, no phone , no email.
-Subscription to premium to use VPN features:
Change your device IP.
Agree
Banned concept
Device Analyze
Quick Scan
Full Scan
Secure Internet
"Your contact is cleaned. No dupplicated found."
Oh good—no duplicates, except for the extra "p" in "dupplicated", I guess?
FREE TRIAL
High value in-app Purchase
Touch ID
Cancel
Best app
Good
Suspicious reviews
Search Ads stage - Banned concept
WEP Password Generator - Wi-Fi Passwords
Apple Confidential nternal Use Only

Abuse timeline

1. Developer submits app with prohibited terms, rejected twice
2. Developer removes problem terms, passes review but with problematic content
3. Once in store, developer:
    1. updates keywords and description post-review
    2. increases in-app pricing post-review
    3. stuffs positive reviews
    4. buys iAd keywords, including banned concept terms
    5. launches external marketing campaign with banned terms
4. Users gulled into subscribing with aggressive call to action
5. Conversion rate sufficient to enter Top Grossing chart

Content quality/compliance

How did this get through App Review?



Problem

Third reviewer not made aware of findings of prior two rejections.

Mitigation

High risk team for submissions following egregious rejections [complete]

Improve tooling for bad content discovery [in progress]

Rejections made correctly the first 2 times. Developer removed problem terms and got through. App was launched, but some content overlooked.

Charting

Why did this appear in Top Grossing?

Problem

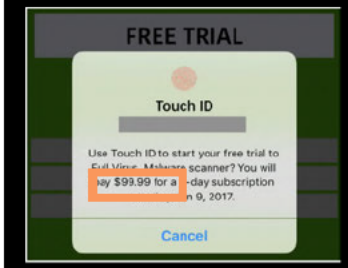
Top Grossing is a straight revenue count.

Mitigation

Chart removed in store redesign [complete]

High-value in-app drives revenue from small # of victims

How did they get a $99.99 in-app into the store?



Problem

Easy to avoid ERB review by raising price after approval

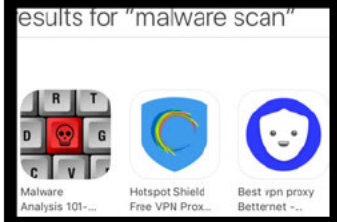
Mitigation

Flag suspicious price changes for review [proposed]

Not a trivial undertaking — a motivated adversary can beat a simple threshold check (as demonstrated). Needs developer reputation and a pipeline for handling these escalations, as well as policy about what happens while under review.

Banned concept shows up in Search

Why does "malware scan" yield results?



Problem

Keywords can change post submission

Mitigation

Live moderation team for discovery [in progress, not scoped to Ads]

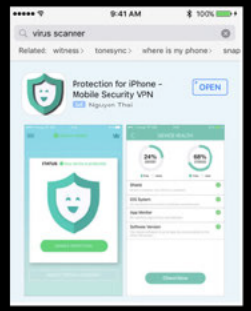
Reduce reliance on keywords; lock down description post-review [in progress]

Apply banned concepts globally: app review, discovery, ads [proposed]

Not a trivial undertaking — a motivated adversary can beat a simple threshold check (as demonstrated). Needs developer reputation and a pipeline for handling these escalations, as well as policy about what happens while under review. Also, it's OK to sell books/videos about these topics — the leftmost icon is one example.

Banned concept shows up in Search ads

Why does "virus scanner" yield results?



Problem

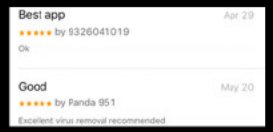
Keywords can change post submission and ads are heavily keyword based

Mitigation

Apply banned concepts globally: app review, discovery, ads [proposed]

Ads runs its own fraud program.

Low quality / low sentiment reviews



Problem

Fraud algorithm scope today is review ranking: not deletion, not banned concept identification

Review moderation is manual and prioritized by scale abuses

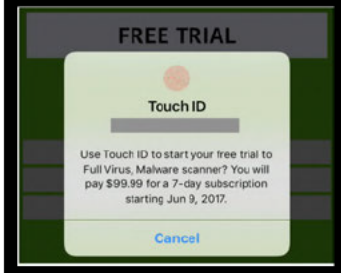
Mitigation

Live moderation team for discovery [in progress]

Automated review deletion [proposed]

"Excellent virus removal recommended" uses a banned concept
"Best app / OK" is a low quality review
Reviews from real uses are overwhelmingly negative

Aggressive in-app solicitation



Problem

Developer can display inApp purchase dialogs repeatedly

Mitigation

Add "report a problem" action in the StoreKit purchase sheet, trigger investigations [proposed]

High cancellation rates trigger investigation [proposed]

May even catch the user trying to exit the app by the home button

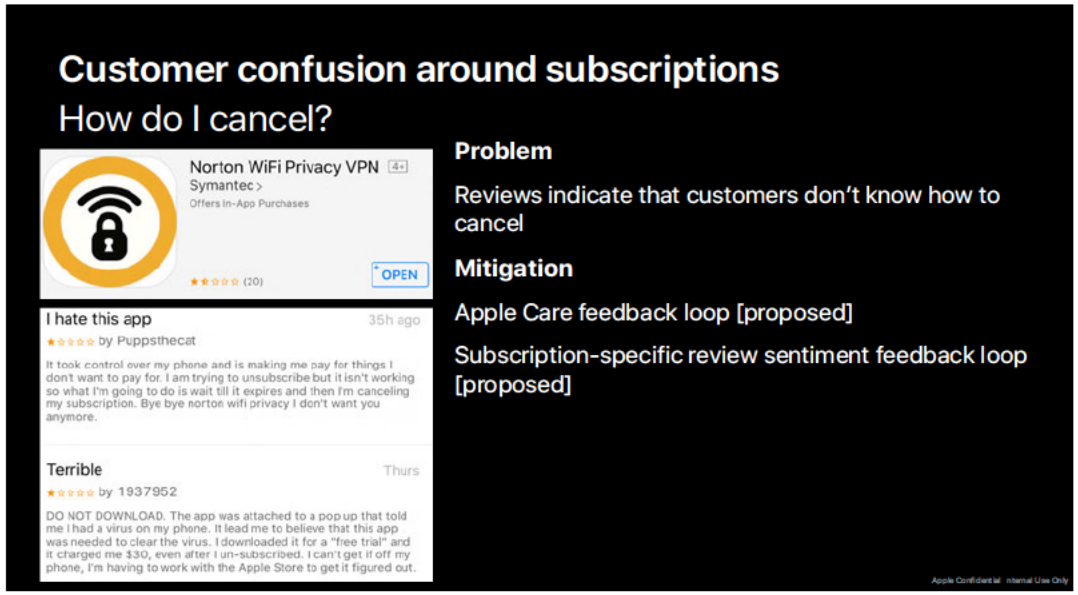
Misleading external campaigns

Problem

Developer can drive conversions with external campaigns, yet keep content within guidelines

Mitigation

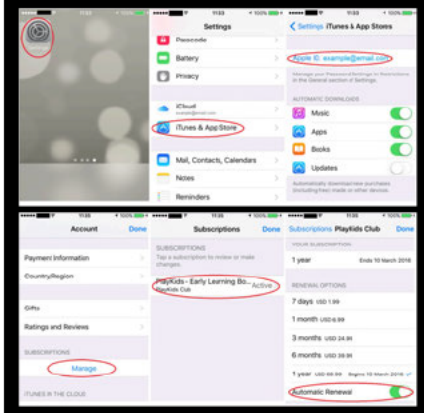
?



Search today is ONLY for discovery. Why doesn't it help users resolve problems? (search for cancel my subscriptions yields no results)

Customer confusion around subscriptions

How do I cancel?



Problem

Numerous web sites providing 6+ step illustrated guides

Mitigation

Clear paths for "managing your subscriptions"

~~when an app is deleted~~ [proposed]

in Search

on Report A Concern

with less than six steps + auth?

Search today is ONLY for discovery. Why doesn't it help users resolve problems? (search for cancel my subscriptions yields no results)
Use CK for subscription cancellation: lower friction

Abuses identified

- Chart manipulation
  - No more top grossing section in the new app store
  - Currently fraudulent apps are taken off from free and paid charts
    - Algorithmically based on untrusted account activity
    - Manually when escalated/ reviewed
  - Upcoming enhancements includes
    - Live moderation
    - Excluding activity from untrusted devices
    - Behavioral anomaly detection
    - Randomized charting algorithm
    - Cohort based charting

Abuses identified

- Suspicious reviews
  - Fake reviews/ sentiment was low
  - Currently fake reviews are removed manually
    - Model driven review ranking is performed
  - Upcoming work includes
    - Model driven review removal and ranking
    - Live moderation
    - Analytical average rating computation
    - Behavioral anomaly detection
    - Review sentiment risking

Abuses identified

- High value in-app/ app
  - Should price range be based on category/ complexity (complexity calculated thru algorithms)?
  - Should >$99 app be approved by a board?
  - Proposal to push to app review if price changes post review

- Aggressive/ misleading marketing/ subscription
  - Should we terminate or action for over aggressive sales?
  - Proposal to
    - Impose hard limits
    - Targeted ‘report a problem’ (StoreKit action using Fraud signal)
    - Metric on per capita/ ratio of downloads vs $ made

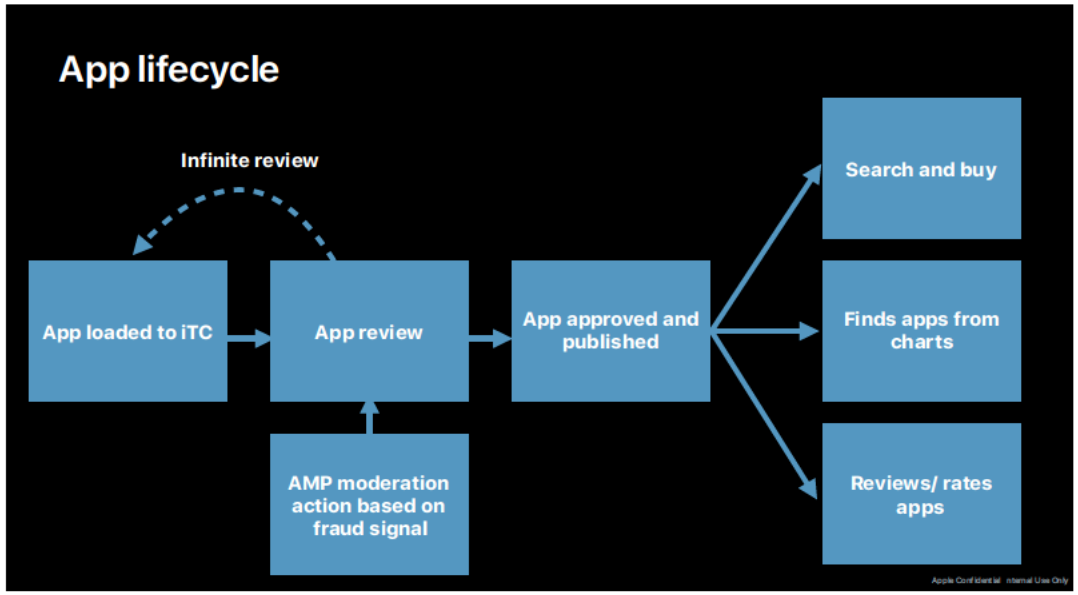
Abuses identified

- Suspicious app
  - Proposal to
    - Rate limit repeated app review submission
    - Mass actioning capability
    - Reduce sensitivity for clone app identification

- Bad category of app (anti-virus)
  - Not allowed today (users were mislead by external marketing sources)
  - Proposal to look into referrer anomalies and reputation

- Search Ads abuse
  - Search ads for banned concepts
  - Currently apps can buy keywords un-related to app to increase visibility
  - Proposal to remove/ blacklist banned concepts and utilize common blacklist with discovery features

Appendix


App lifecycle
Infinite review
App loaded to iTC
App review
App approved and published
Search and buy
Finds apps from charts
Reviews/ rates apps
AMP moderation action based on fraud signal
Apple Confidential nternal Use Only

Nature of AMP Search abuse

Abuse vector	Why?	How?	What we do today?	Upcoming enhancements
Manipulate search query app ranking	Increase visibility of the app	Scripted and incentivized conversion	Search session filtering based on factory device data, device profiles, purchase behavior and account type Title keyword filtering	Behavioral Anomaly Detection Live moderation
Manipulate search hints			Search hints blacklist	Use fraud filtered sessions Blacklisting banned concepts Live moderation

Nature of AMP Search abuse

Abuse vector	Why?	How?	What we do today?	Upcoming enhancements
Manipulate search query app ranking	Increase visibility of the app	Scripted and incentivized conversion	Search session filtering based on factory device data, device profiles, purchase behavior and account type Title keyword filtering	Behavioral Anomaly Detection Live moderation
Manipulate search hints			Search hints blacklist	Use fraud filtered sessions Blacklisting banned concepts Live moderation

Nature of AMP Charts abuse

Abuse vector	Why?	How?	What we do today?	Upcoming enhancements
Apps in top charts due to fraudulent purchase activity	Increase visibility of the app Get more downloads Investor manipulation	Scripted and incentivized conversion	Account neutralization Chart algorithm tuning	Device neutralization Behavioral anomaly detection Randomized charting algorithm Cohort based charting Live moderation

Nature of AMP Rating and Review abuse

Abuse vector	Why?	How?	What we do today?	Upcoming enhancements
Creating fake ratings	Increase average rating	Scripted/ fake ratings	Manual removal of fake ratings	Model driven rating risking Analytical average rating computation Live moderation
Inject fake reviews	Mislead customers		Rank reviews in order of usefulness Manual removal of reviews	Model driven removal of reviews Behavioral anomaly detection Review sentiment risking
	De value competitor app			

Nature of iAd abuse

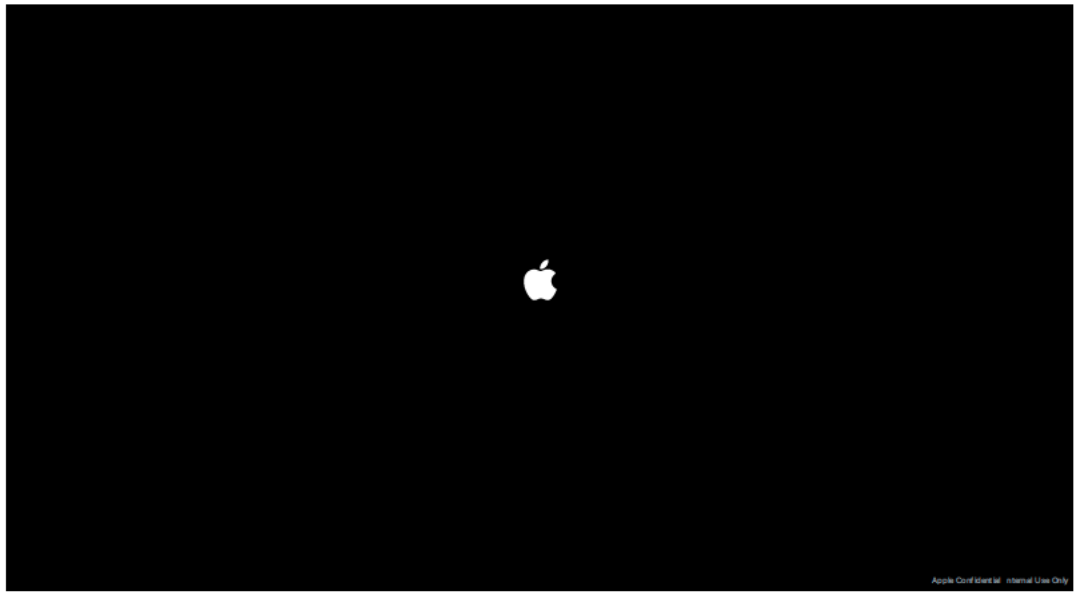
Abuse Vector	Why?	How?	What we do today?	Proposal
Search ads abuse	Increase app visibility	Buy keywords un related to app	Policy controls on banned categories	??
External marketing		Out of guidelines 3rd party marketing	None	Referrer anomalies and reputation

Nature of iTC abuse

Abuse vector	Why?	How?	What we do today?	Proposal
Repetitive submission on rejection	Attempting to target weakest link	Repetitive attempts with minimal changes	No penalty	Rate limit
Change app price	Defraud customers	Price changes are not reviewed	None	Push change in price to app review Policy category/ complexity based pricing Process price change to >$99 apps ERB ed

Nature of iTC abuse

Abuse vector	Why?	How?	What we do today?	Proposal
Clone apps	Get multiple similar apps to increase coverage/ visibility	Submit similar apps	Similarity scanning	Adjust similarity sensitivity Mass actioning capability Risk guided App Review
DDOS customer for subscriptions	Defraud customers	Prompting for subscription repetitively	None	Impose hard limits Targeted report a problem Policy terminate app over aggressive sales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