Reducing power and bandwidth use in apps to keep users happy

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Networks

- Networks can be metered
- Metered status is broadcast by the network, or set by the user
- Metered networks are generally slow or cost money per unit data
Metered API

Gio.NetworkMonitor.network-metered
Metered UI considerations

Feedback

Feedback includes design patterns for showing information about events and status, as well as for prompting users for a response.

Figure: The HIG page on UI feedback patterns
Metered UI considerations

Notifications

Notifications are used to inform users about events that are relevant to them. Examples include:

- when a download or other long-running operation has finished
- when new content is available
- when a message has been received

Because they are shown by the system, notifications are a useful way of communicating with users while they are using other apps. If a message is only relevant while the sender app is being used, toasts are a better option.

General Guidelines

- Be careful not to needlessly distract users with notifications, and question whether users really need to be informed about the events you want to communicate.

Figure: The HIG page on notifications
Metered UI considerations

Toasts

Toasts are popup banners that contain a label and sometimes a button. They are always transient and user dismissible.

When to Use

Toasts can be used to show messages and actions in the context of using an app. Typically they are shown in response to a user action. One common use for toasts is to show an undo button after a destructive action.

Toasts are transient and are therefore best suited to communicating individual events, as opposed to ongoing states. The latter are better served by banners.

Since toasts are only shown in the context of an app's window, they are only appropriate for feedback that is useful while the app is being used. If it is useful for a message to be visible while the app is not being used, a notification is probably a better choice.

Figure: The HIG page on toasts
Metered UI considerations

Banners

A banner is a strip along the top of a view, which contains a title and an optional button. They are used to communicate persistent states.

Examples include indicating that an app is offline, or that a document is read-only. They can also be used to present supplementary information about special locations or content items.

**When to Use**

Banners do not automatically hide, and are displayed for ongoing periods of time. This makes them appropriate for communicating states or location-specific information.

Don't use a banner to communicate events, one-time messages, or short-lived states: use notifications or toasts instead.

Banners are deliberately attention-grabbing, and should therefore only be used to communicate important information.
Metered example: Fragments

Figure: Fragments showing an infobar on a metered network
Metered example: Fragments

- [https://gitlab.gnome.org/World/Fragments/-/merge_requests/156](https://gitlab.gnome.org/World/Fragments/-/merge_requests/156)
- Pause torrents when moving onto a metered network
- Resume them when moving off the metered network (unless the user has modified them since)
- Display an infobar while metered
Metered example: Déjà Dup

Figure: Déjà Dup showing a notification when on a metered network
Metered example: Déjà Dup

🔗 https://gitlab.gnome.org/World/deja-dup/-/blob/main/libdeja/Network.vala#L59

🐾 Doesn’t begin a backup while on a metered network
🐾 ...unless a preference is set to override this
Power

- Traditionally restricted to ‘is the computer on battery?’
- Now a wider definition: power saver mode
- Can be explicitly enabled by the user in anticipation of being away from power for a long time
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Power API

Gio.PowerProfileMonitor.power-saver-enabled
Power UI considerations

Feedback

Feedback includes design patterns for showing information about events and status, as well as for prompting users for a response.

Figure: The HIG page on UI feedback patterns
Power example: Blanket

Figure: Blanket showing a toast when pausing sounds in power-saver mode
Power example: Blanket

- [https://github.com/rafaelmardojai/blanket/pull/312](https://github.com/rafaelmardojai/blanket/pull/312)
- Pauses background playback when entering power saver mode
- Shows a toast explaining why playback has been paused
- In case Blanket’s UI is not visible, this toast doesn’t have a timeout
Power example: NewsFlash

```rust
pub fn schedule_sync(&self) {
    let imp = self.imp();
    GtkUtil::remove_source(imp.sync_source_id.take());
    let sync_interval = imp.settings.borrow().get_sync_interval();
    let sync_on_metered_connection = imp.settings.borrow().get_sync_on_metered();
    if let Some(sync_interval) = sync_interval.as_seconds() {
        imp.sync_source_id.borrow_mut().replace(glib::timeout_add_seconds_local(
            sync_interval,
            clone!(@weak self as this => @default-panic, move || {
                let network_monitor = gio::NetworkMonitor::default();
                let power_profile_monitor = gio::PowerProfileMonitor::get_default();

                // check if on metered connection and only sync if chosen in preferences
                // also only sync if power saving mode (low battery, etc.) is not enabled
                if (!network_monitor.is_network_metered() || sync_on_metered_connection) &&
                    !power_profile_monitor.is_power_saver_enabled() {
                    this.sync();
                } else {
                    self.imp().sync_source_id.take();
                }
            }
        ),
    }
}
```

**Figure:** The code from NewsFlash to disable background syncing
Power example: NewsFlash


🔗 Affects whether to enable background syncing of news feeds
🔗 Adds to existing logic which disables them on metered networks
🔗 No UI
What haven’t I covered?

✨ Profile your apps for power usage: reduce wakeups, reduce spinning
✨ powertop is amazing
✨ Profile your apps for network usage too: nethogs
✨ Gio.MemoryMonitor.low-memory-warning
✨ Don’t use web views or write your app using web technologies if you can help it, they’re terrible for power use
✨ Occasionally look at your project’s CI resource and GitLab disk use
Miscellany

Metered data initiative
https://gitlab.gnome.org/GNOME/Initiatives/-/issues/42

Power-saver initiative
https://gitlab.gnome.org/GNOME/Initiatives/-/issues/43

Low memory initiative
https://gitlab.gnome.org/GNOME/Initiatives/-/issues/44

Slide source
https://gitlab.gnome.org/pwithnall/
guadec-power-bandwidth-presentation-2023

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Beamer theme: https://gitlab.gnome.org/GNOME/presentation-templates/tree/master/GUADEC/2023