# Present web pages to secondary attached displays

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Dives into Chromium source code

Chrome 66 allows web pages to use a secondary attached display through the Presentation API and to control its contents through the Presentation Receiver API.

1/2. User picks a secondary attached display


2/2. A web page is automatically presented to the display previously picked

## Background

Until now, web developers could build experiences where a user would see local content in Chrome that is different from the content they'd see on a remote display while still being able to control that experience locally. Examples include managing a playback queue on youtube.com while videos play on the TV, or seeing a slide reel with speaker notes on a laptop while the fullscreen presentation is shown in a Hangout session.

There are scenarios though where users may simply want to present content onto a second, attached display. For example, imagine a user in a conference room outfitted with a projector to which they are connected via an HDMI cable. Rather than mirroring the presentation onto a remote endpoint, **the user really wants to present the slides full-screen on the projector**, leaving the laptop screen available for speaker notes and slide control. While the site author could support this in a very rudimentary way (e.g. popping up a new window, which the user has to then manually drag to the secondary display and maximize to fullscreen), it is cumbersome and provides an inconsistent experience between local and remote presentation.

**Key Point:** This change is about enabling secondary, attached displays to be used as endpoints for presentations in the same way as remote endpoints.

## Present a page

Let me walk you through how to use the Presentation API to present a web page on your secondary attached display. The end result is available at https://googlechrome.github.io/samples/presentation-api/.

First, we'll create a new `PresentationRequest` object that will contain the URL we want to present on the secondary attached display.

```
const presentationRequest = new PresentationRequest('receiver.html');
```

In this article, I won't cover use cases where the parameter passed to `PresentationRequest` can be an array like `['cast://foo', 'apple://foo', 'https://example.com']` as this is not relevant there.

We can now monitor presentation display availability and toggle a "Present" button visibility based on presentation displays availability. Note that we can also decide to always show this button.

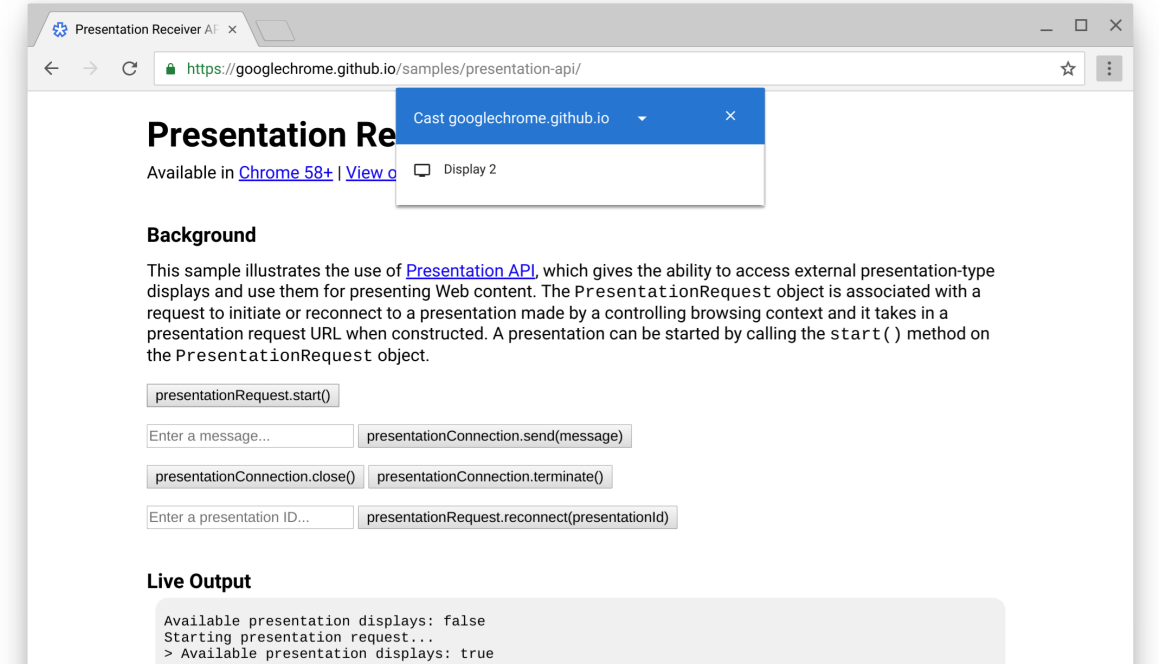
**Caution:** the browser may use more energy while the `availability` object is alive and actively listening for presentation display availability changes. Please use it with caution in order to save energy on mobile.

```
presentationRequest.getAvailability()
.then(availability => {
  console.log('Available presentation displays: ' + availability.value);
  availability.addEventListener('change', function() {
    console.log('> Available presentation displays: ' + availability.value);
  });
})
.catch(error => {
  console.log('Presentation availability not supported, ' + error.name + ': ' +
      error.message);
});
```

Showing a presentation display prompt requires a user gesture such as a click on a button. So let's call `presentationRequest.start()` on a button click and wait for the promise to resolve once the user has selected a presentation display (.e.g. a secondary attached display in our use case).

```
function onPresentButtonClick() {
  presentationRequest.start()
  .then(connection => {
    console.log('Connected to ' + connection.url + ', id: ' + connection.id);
  })
  .catch(error => {
    console.log(error);
  });
}
```

The list presented to the user may also include remote endpoints such as Chromecast devices if you're connected to a network advertising them. Note that mirrored displays are not in the list. See http://crbug.com/840466.




When promise resolves, the web page at the **`PresentationRequest`** object URL is presented to the chosen display. Et voilà!

We can now go further and monitor "close" and "terminate" events as shown below. Note that it is possible to reconnect to a "closed" **`presentationConnection`** with **`presentationRequest.reconnect(presentationId)`** where **`presentationId`** is the ID of the previous **`presentationRequest`** object.

```
function onCloseButtonClick() {
  // Disconnect presentation connection but will allow reconnection.
  presentationConnection.close();
}

presentationConnection.addEventListener('close', function() {
  console.log('Connection closed.');
});

function onTerminateButtonClick() {
  // Stop presentation connection for good.
  presentationConnection.terminate();
}

presentationConnection.addEventListener('terminate', function() {
  console.log('Connection terminated.');
});
```

## Communicate with the page

Now you're thinking, that's nice but how do I pass messages between my controller page (the one we've just created) and the receiver page (the one we've passed to the **`PresentationRequest`** object)?

First, let's retrieve existing connections on the receiver page with **`navigator.presentation.receiver.connectionList`** and listen to incoming connections as shown below.

```
// Receiver page

navigator.presentation.receiver.connectionList
.then(list => {
  list.connections.map(connection => addConnection(connection));
  list.addEventListener('connectionavailable', function(event) {
    addConnection(event.connection);
  });
});

function addConnection(connection) {

  connection.addEventListener('message', function(event) {
    console.log('Message: ' + event.data);
    connection.send('Hey controller! I just received a message.');
  });

  connection.addEventListener('close', function(event) {
    console.log('Connection closed!', event.reason);
  });
}
```

A connection receiving a message fires a "message" event you can listen for. The message can be a string, a Blob, an ArrayBuffer, or an ArrayBufferView. Sending it is as simple as calling **`connection.send(message)`** from the controller page or the receiver page.

```
// Controller page

function onSendMessageButtonClick() {
  presentationConnection.send('Hello!');
}

presentationConnection.addEventListener('message', function(event) {
  console.log('I just received ' + event.data + ' from the receiver.');
});
```

Play with the sample at https://googlechrome.github.io/samples/presentation-api/ to get a sense of how it works. I'm sure you'll enjoy this as much as I do.

## Samples and demos

Check out the official Chrome sample we've used for this article.

I recommend the interactive Photowall demo as well. This web app allows multiple controllers to collaboratively present a photo slideshow on a presentation display. Code is available at https://github.com/GoogleChromeLabs/presentation-api-samples.

Photo by José Luis Mieza / CC BY-NC-SA 2.0

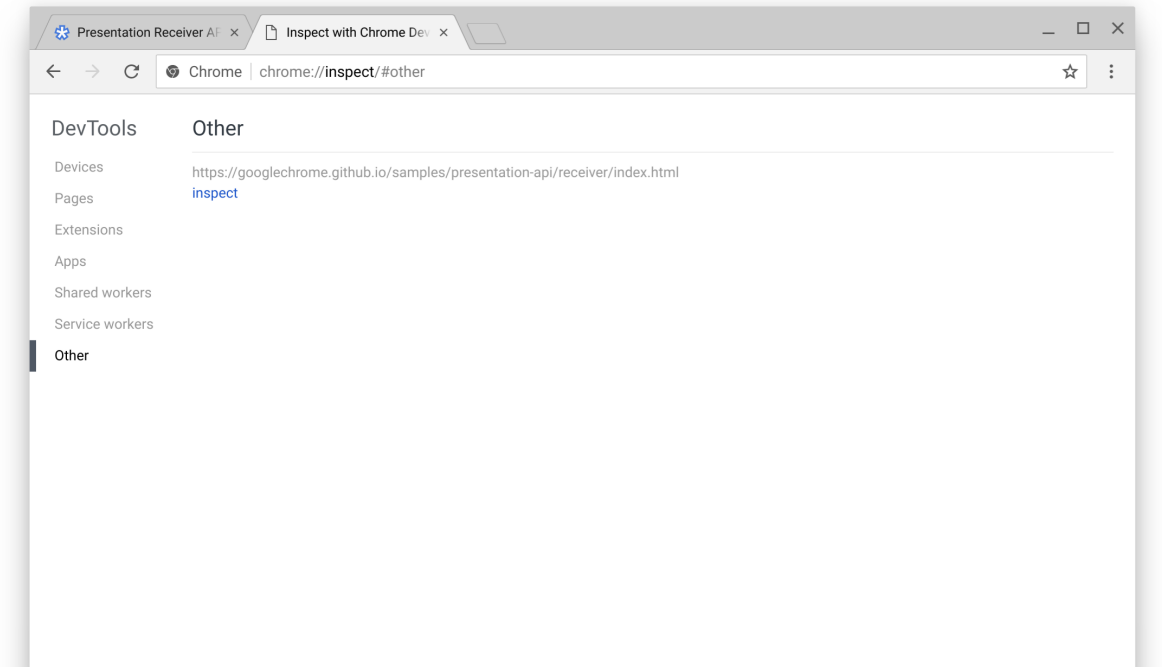
## One more thing

Chrome has a "Cast" browser menu users can invoke at any time while visiting a website. If you want to control the default presentation for this menu, then assign **`navigator.presentation.defaultRequest`** to a custom **`presentationRequest`** object created earlier.

```
// Make this presentation the default one when using the "Cast" browser men
navigator.presentation.defaultRequest = presentationRequest;
```

## Dev tips

To inspect the receiver page and debug it, go to the internal `chrome://inspect` page, select "Other", and click the "inspect" link next to the currently presented URL.




You may also want to check out the internal `chrome://media-router-internals` page for diving into the internal discovery/availability processes.

## What's next

As of Chrome 66, Chrome OS, Linux, and Windows platforms are supported. Mac support will come later.

## Resources

- Chrome Feature Status: https://www.chromestatus.com/features#presentation%20api
- Implementation Bugs: https://crbug.com/?q=component:Blink>PresentationAPI
- Presentation API Spec: https://w3c.github.io/presentation-api/
- Spec Issues: https://github.com/w3c/presentation-api/issues

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