Integrating Video Conferencing into Everyday Applications

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Calls integrated

- Calls in their own app
  - Easy!
  - Skype, Ekiga, WLM, etc

- Call directly in other apps
  - NEW!
  - EXCITING!
  - INNOVATIVE!

Ingredients

- Call signallings
  - Telepathy
- Media Framework
  - GStreamer
- Call protocol abstraction
  - Farsight 2

Farsight 2: Overview

- Audio & video conferencing abstraction

- Multiple protocols abstracted

  - RTP (XMPP Jingle, SIP, MSN SIP, etc)

  - MSN Webcam

  - Raw (soon)

  - Others...

- Regular GStreamer element

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Widely deployed

- Maemo

- MeeGo

- GNOME's Empathy

- New KDE Telepathy Call UI

- Pidgin

- aMSN

decodebin for calls

- Encoder
- Decoder
- Payloader
- Depayloader
- Network sources
- Network sinks

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High level objects

- Participants
  - People
- Sessions
  - Media types (audio, video)
- Stream
  - Intersection of Participant and Session

Session

- One type of media (audio, video, etc)
- One local media source
  - One microphone
  - One camera
  - File
  - etc
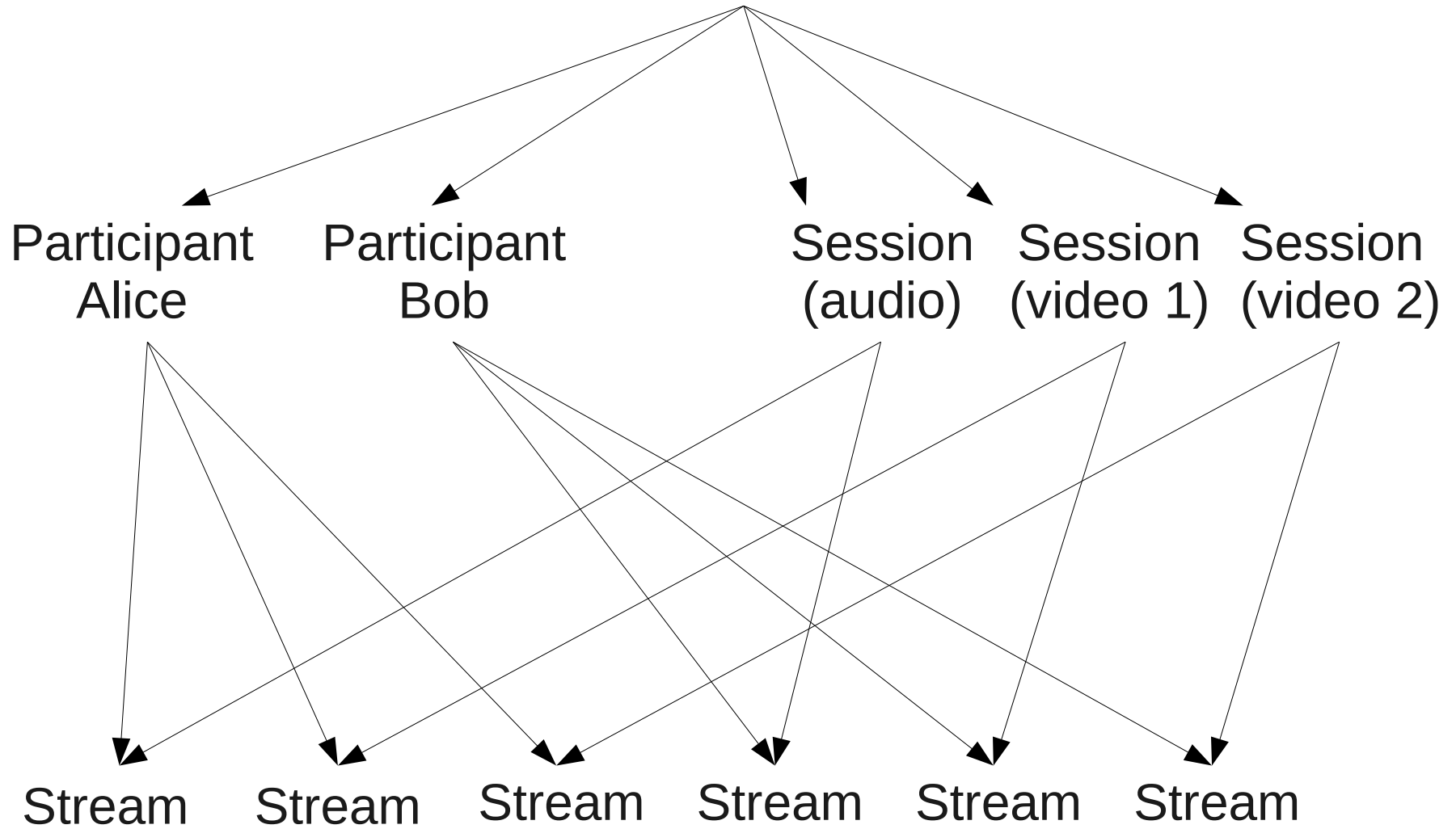- Multiple stream from other participants
- RTP session

Stream

- One participant in one session

- Use for communication with participant
  - Codecs
  - Candidates

- Remote media comes out of here

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Conference

- The GStreamer element
- Multiple synchronized sessions
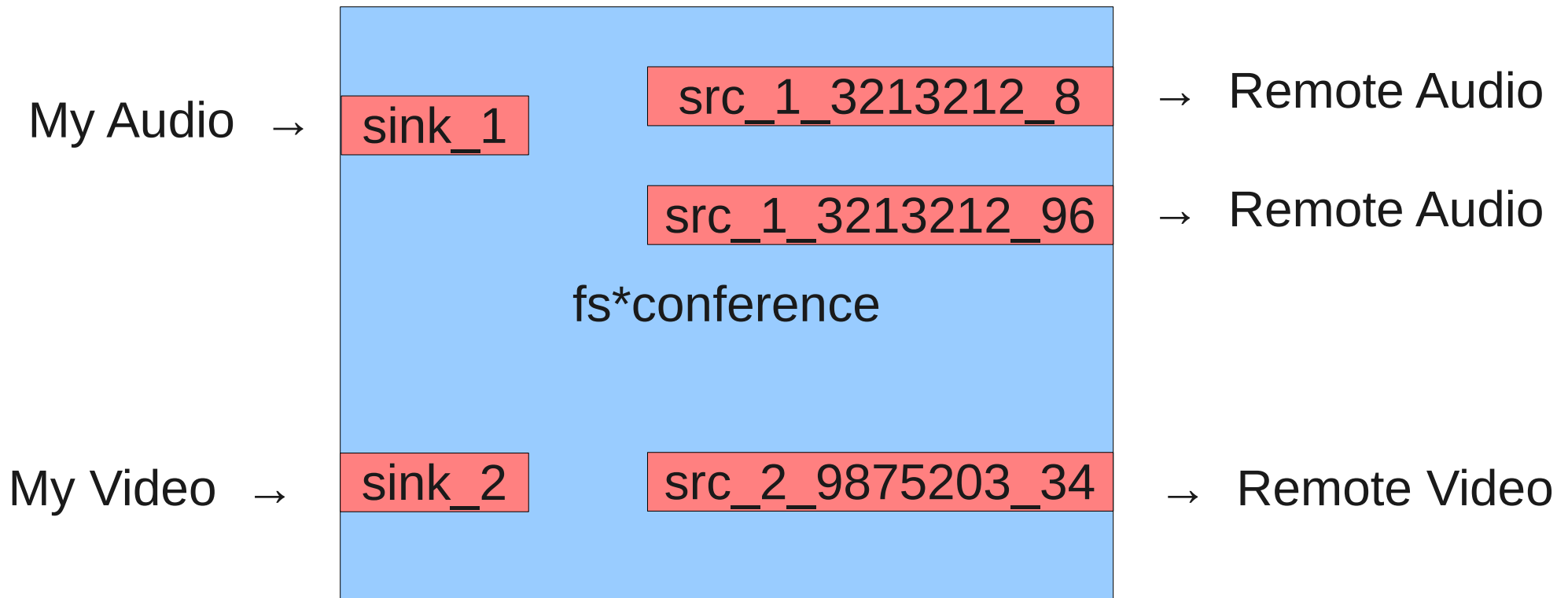- Contains everything else

Farsight 2: RTP

- Complete RTP with RTCP
  - Including A/V sync
- Full DTMF
- Offer/Answer Codec Negotiation
- Multiple transports for RTP
  - ICE (RFC, Google and MSN)
  - Unicast UDP
  - Multicast UDP
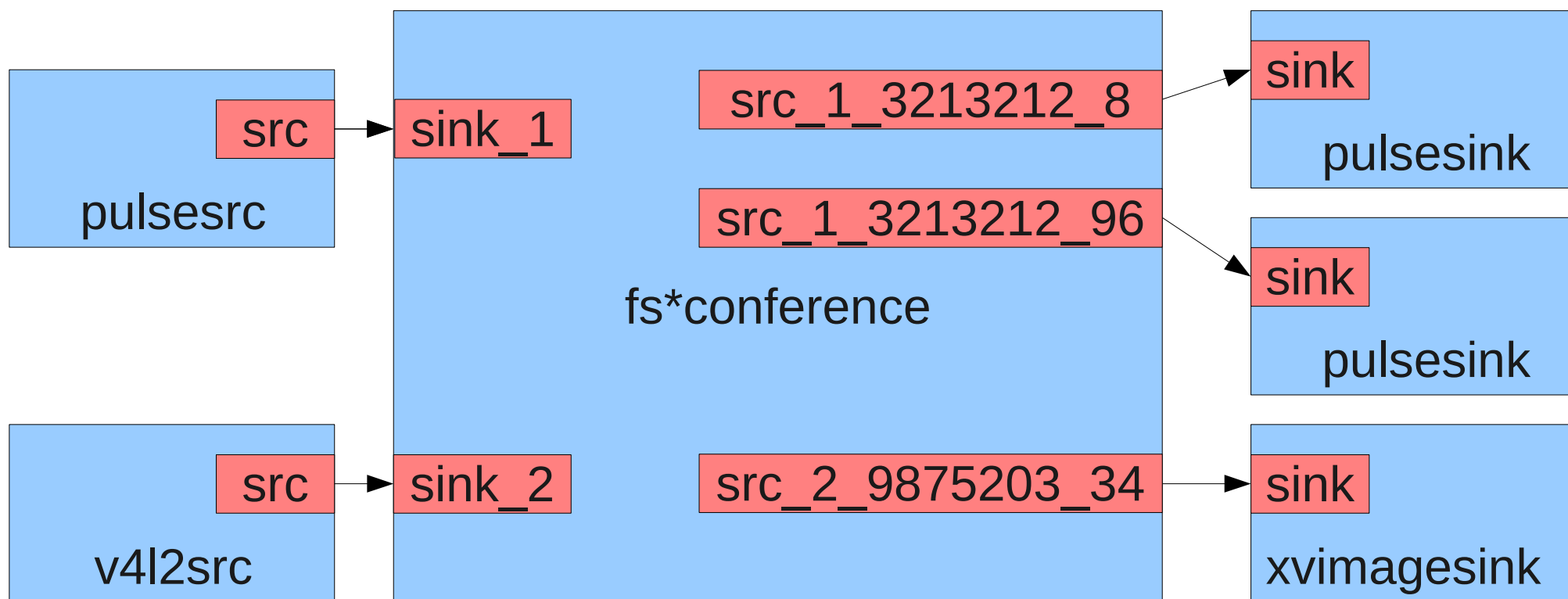 - Shared memory

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Telepathy Farsight integration

- Telepathy-Farsight library
- Hides all signalling
  - Easy API
- Telepathy streamed media interface limited
  - Only one-to-one
  - Strange session/stream separation
- New Call interface is the bright future
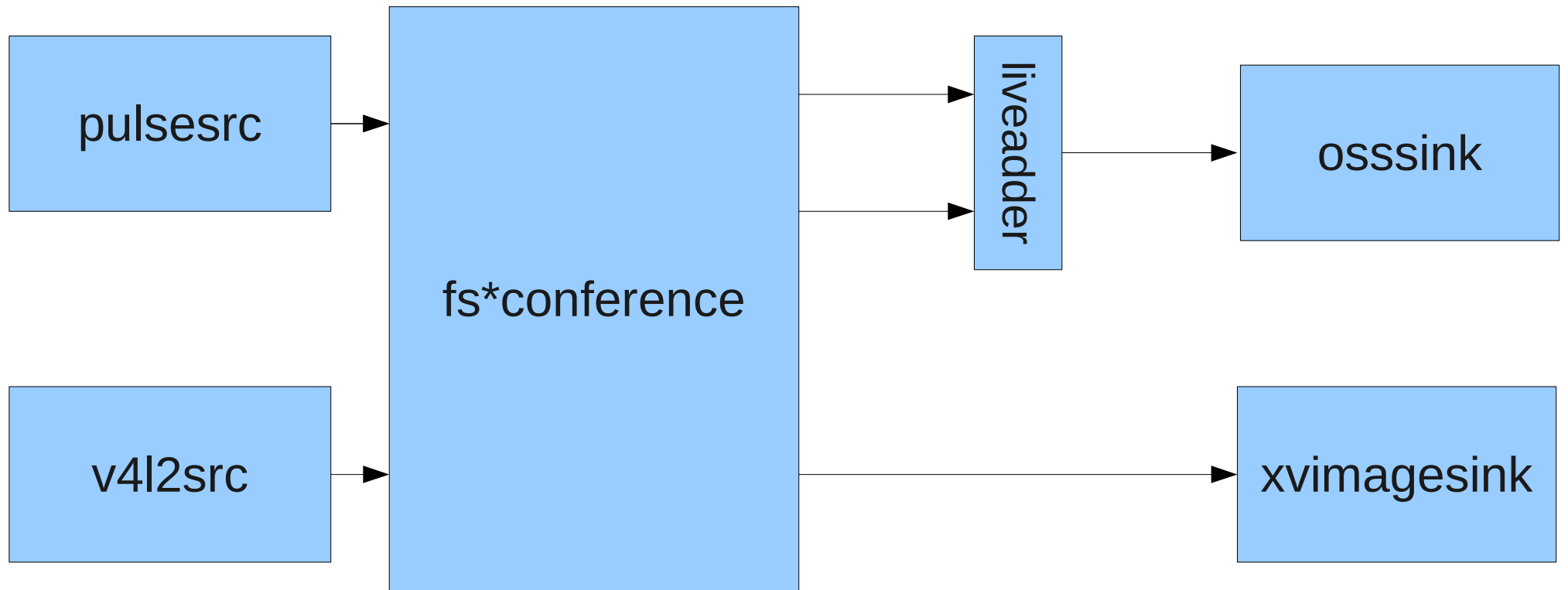 - Will require some improvements in tp-fs

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Farsight 2 element

My Audio → sink_1

src_1_3213212_8 → Remote Audio

src_1_3213212_96 → Remote Audio

fs*conference

My Video → sink_2

src_2_9875203_34 → Remote Video

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Integrated Farsight 2: Simple Case

pulsesrc — src → sink_1

v4l2src — src → sink_2

fs*conference

src_1_3213212_8 → sink (pulsesink)

src_1_3213212_96 → sink (pulsesink)

src_2_9875203_34 → sink (xvimagesink)

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Another simple case

Adding More stuff

Add recording

pulsesrc → fs*conference

v4l2src → fs*conference

fs*conference → tee → pulsesink

tee → vorbisenc → oggmux → filesink

tee → theoraenc → oggmux

tee → xvimagesink

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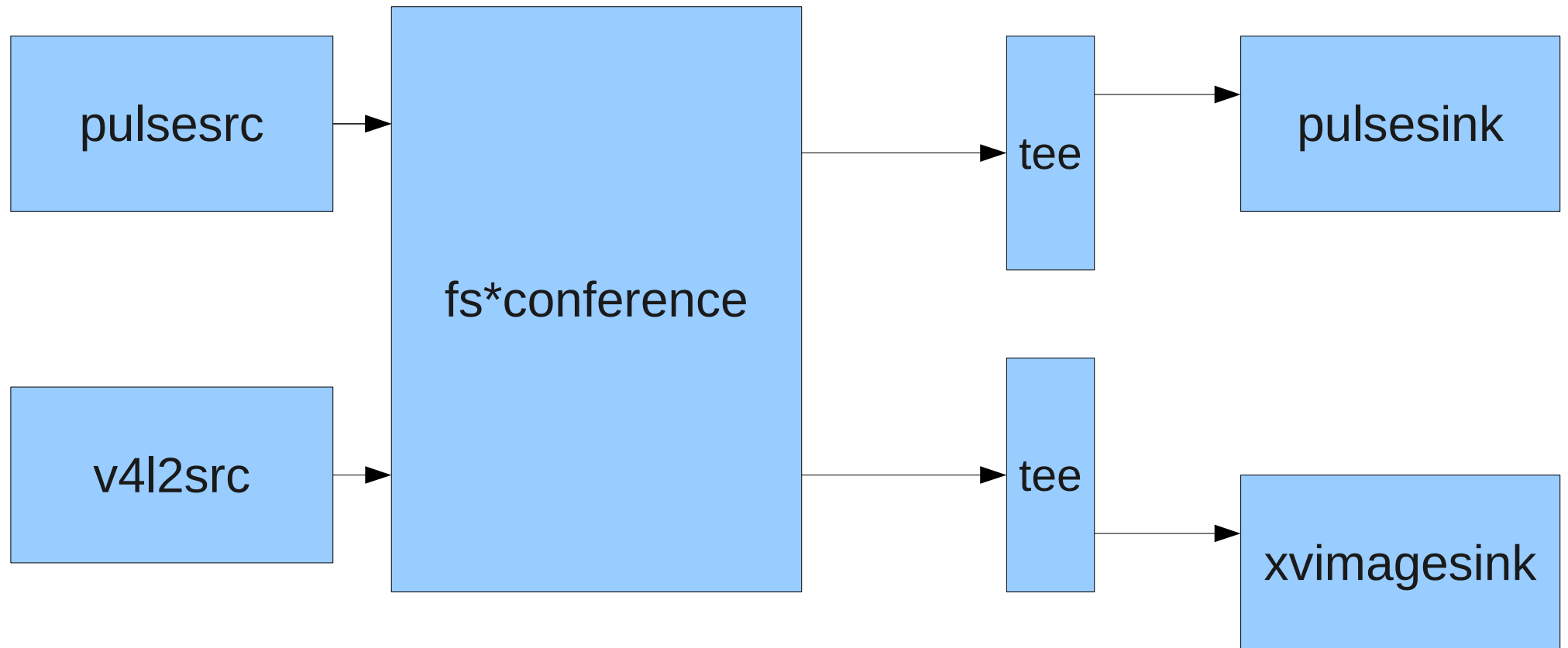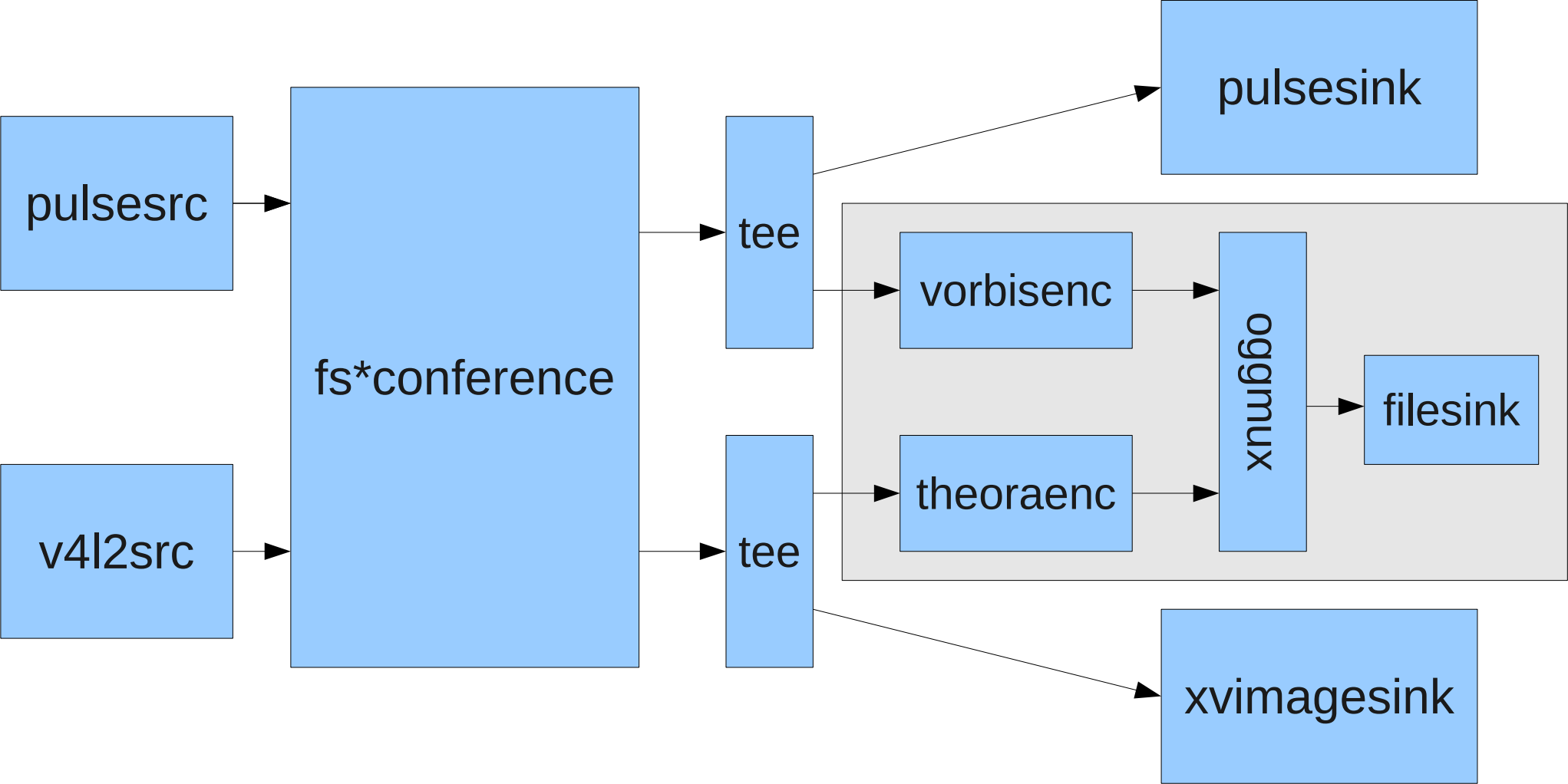
Steps to get a Telepathy call

1. Get D-Bus bus
2. Get Telepathy Account & Contact
3. Find the handle for that contact
4. Request a Telepathy Channel
5. Wrap it into Telepathy-Python
6. Wrap it into Telepathy-Farsight
7. Attach session-created and session-created
8. Add members
9. Request streams

Steps to get a Telepathy call

10. Put the conference into the pipeline on Telepathy session creation

11. Add/Link the sink/source on stream creation

Extras

- Hook up UI to add added streaming-side features

- Example:

  - The Record button adds the recording pipeline

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Soon in Farsight2

- Developer ease of use
- Adaptive behaviour for better quality

Ease of use

- Brought to you by Youness Alaoui

- Magical source and sink

- Filters

- Even higher level APIs

  - For custom Uis

  - Adjustable level of abstraction

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Auto Sources & Sinks

- Auto-discovery across APIs

  - Video4Linux 1

  - Video4Linux 2

  - DV cams ?

  - Etc

- Dynamically switch

- GstPropertyProbe sucks

  - Need a better Interface

Source

- Adds tee

- Only start source when needed

  - When something is connected (to the tee)

  - Property to disable it (for Hold)

Sink

- Add mixing only if required
- Drop all buffers using easy API (for Hold)

Filter

- Between two pads
- NOT an element, maybe includes many
- Attach to a pad
  - Returns a new pad
- Transforms GstMessages to signals
- Works in both directions

Filter Manager

- Handle adding multiple filters

- Works with playing pipeline

    - Does pad blocking magic

- Simple API

Multi Filter Manager

- Same API as regular Filter Manager
- Same filters
- Multiple pads
- Useful when using sinks that mix

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Simple Farsight ⇒ Fsu

- FsuConference

- FsuSession

- FsuStream

- Do all the plugging

- Zero GStreamer knowledge required

Telepathy-Fsu

- Library
- Above Fsu & Telepathy-Farsight
- Telepathy Call handler without a UI
- Ideal for Mobile

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Adaptive behaviours

- Standards based

- Experimental !!!

- Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (AVPF)

  - Keyframes on demand

  - NACKs

  - Other feedback

- TCP Friendly Rate Control (TFRC)

More to come ?

- Generic Forward Error Correction (FEC)
  - Which type to use ?
- Interactive Connectivity Establishment (ICE) with SIP
  - SIP Forking & ICE
  - Contiguous ports for fallback
- Secure RTP (SRTP)

What can you do ?

- Innovative Call UIs
- Collaborative text editing
  - OOo, Abiword, Gnumeric, KOffice
- Stream slides with Evince, Okular
- Remote desktop viewing (exists using VNC)
- Mobile UIs
- Other ideas?

Collabora

Thank you

- #farsight, #telepathy, #gstreamer @ FreeNode
- #empathy @ GimpNet
- http://farsight.freedesktop.org/
- http://telepathy.freedesktop.org/
- http://gstreamer.net/