Summary of the Analysis of the T.38 Malformed Packets

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1 Initial Call Setup (G.711 Audio Call)

- **Client to Server (SIP INVITE)**:
  - The client initiated a call using **SDP** with the **G.711U and G.711A codecs**, indicating an audio call.
  - Media port on client: **10338** (used for sending audio to the server).
  - The server responded with **200 OK** (SIP response) to confirm it was ready to receive call data.
  - Media port on server: **16834** (used to receive and stream audio).
  - The client sent an **ACK**, and a two-way audio call was established using **G.711 codecs**.

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2 T.38 Negotiation (Switch from G.711 to T.38 Fax)

- During the audio call, the **server sent a second SIP INVITE** to the client to switch the media type to **T.38 fax protocol**.
- The server requested to continue using **port 16834** for the T.38 image data (same port used previously for audio).
- The client responded with **100 Trying** to acknowledge receipt and indicate that it was processing the request.
- The client then sent a **200 OK** to confirm it was ready to receive T.38 fax data.
- The client used a new port, **10340**, for receiving T.38 image data.
- The server acknowledged this change using **ACK**.

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3 Call Termination

- After the fax session ended, the client sent a **BYE** message to end the call.
- The server responded with **200 OK**, confirming the call termination.

Key Observations

1. **Port Usage**
   - **Server's port (16834)**: Used for **both G.711 audio and T.38 fax** data.
   - **Client's ports (10338 and 10340)**: The client used different ports for receiving **audio (10338)** and **T.38 image data (10340)**.

2. **Why Were T.38 Packets Malformed?**
   - When the media switched from **G.711 to T.38**, the server kept using port **16834**.
   - Since the switch was not instantaneous, some residual **RTP audio packets** were still being sent on **port 16834**.
   - As referenced in this post on the Wireshark Q&A site, **Wireshark's telephony analyzer expects an immediate switchover**, assuming the first media packet after renegotiation is

already **T.38**.
    - However, when audio RTP packets continue for a short while after the switchover, Wireshark may misinterpret and dissect these as **T.38 packets**, leading to **"malformed packet"** errors.
    - Only the first few packets after the renegotiation are malformed; the rest are clean T.38 packets.

🛠 Root Cause of the Problem

- **Incorrect Vega Settings**:
  The issue occurred because the **Vega gateway was misconfigured** to receive **T.38 signals on the wrong port**.
  Instead of properly switching to the port designated for **T.38 fax**, the Vega was still trying to receive **fax data on the audio (RTP) port**.
  As a result, the fax data was not properly received, and Wireshark marked the initial T.38 packets as malformed.

☑ Correct Solution

1. **Correct Vega Configuration**:
    - The solution was to configure the **Vega gateway** to receive **T.38 fax data on the audio port** (Port 16834).
    - This ensures that the T.38 image data is properly received on the same port as G.711 audio, which is in line with the negotiated media parameters.
2. **Avoid Misinterpretation of Ports**:
    - Avoid changing ports during the switch from **G.711 to T.38** to prevent media confusion.
    - If a port change is required, ensure it is clearly signaled during the **SIP re-INVITE**.

📋 Conclusion

- The root cause of the issue was **incorrect Vega gateway settings** that caused it to expect **T.38 signals on the wrong port**, resulting in no fax data being received.
- The **correct solution** was to configure the Vega to **receive T.38 fax data on the same port as the audio (16834)**.
- As referenced in the Wireshark Q&A post, **Wireshark expects a clean and immediate switchover from RTP (audio) to T.38**. Any residual RTP packets on the media port can be misinterpreted as **malformed T.38 packets**, but this issue is often resolved once the correct configuration is applied.

📋 Files

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