

其他的配置默认即可。

GB28181配置好以后,需要启动摄像机GB28181服务。

启动摄像机GB28181的方法是勾选"启用"选项,启动成功后,摄像机会向SIP Server发送注册消息,通过抓包可以看到具体的注册消息内容:

Filter:	sip && ip.addr eq 192.168.1.65		Expression Clear Apply Save						
lo.	Time	Source	Destination	Protocol	Length	Info			
	13 2017-09-12 2	23:43:28.0190820192.168.1.65	192.168.1.102	SIP	437	Request: R	EGISTER	sip:34020	0000020000000
	14 2017-09-12 2	23:43:28.0191150192.168.1.102	192.168.1.65	ICMP	465	Destination	n unreac	hable (Po	rt unreachab
	82 2017-09-12 2	23:43:32.0417400192.168.1.65	192.168.1.102	SIP	437	Request: R	EGISTER	sip:34020	0000020000000
	83 2017-09-12 2	23:43:32.0417780192.168.1.102	192.168.1.65	ICMP	465	Destination	n unreac	hable (Po	rt unreachab
1	10 2017-09-12 2	23:43:36.0796720192.168.1.65	192.168.1.102	SIP	437	Request: R	EGISTER	sip:34020	0000020000000
1	12 2017-09-12 2	23:43:36.0797130192.168.1.102	192.168.1.65	ICMP	465	Destination	n unreac	hable (Po	rt unreachab
2	44 2017-09-12 2	23:43:40.0912580192.168.1.65	192.168.1.102	SIP	437	Request: R	EGISTER	sip:34020	0000020000000
2	45 2017-09-12 2	23:43:40.0913460192.168.1.102	192.168.1.65	ICMP	465	Destination	n unreac	hable (Po	rt unreachab
2	02 2017 00 12 2	7.47.47 4441000107 160 1 65	107 169 1 107	CTD	171	Doguest. D	CCTCTED	cin. 24020	000000000000000000000000000000000000000

图2 摄像机发送注册消息图

看下注册消息的具体内容:

```
14 2017-09-12 23:43:28.019115000 192.168.1.102 192.168.1.65 ICMP 465 Destination unreachable (Port unreachable)
m Frame 14: 465 bytes on wire (3720 bits), 465 bytes captured (3720 bits) on interface 0
Ethernet II, Src: 98:54:1b:a2:82:b7 (98:54:1b:a2:82:b7), Dst: a4:14:37:e0:f6:d9 (a4:14:37:e0:f6:d9)
⊕ Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst: 192.168.1.65 (192.168.1.65)
☐ Internet Control Message Protocol
   Type: 3 (Destination unreachable)
   Code: 3 (Port unreachable)
   Checksum: 0x8299 [correct]

⊕ Internet Protocol Version 4, Src: 192.168.1.65 (192.168.1.65), Dst: 192.168.1.102 (192.168.1.102)

  ⊕ User Datagram Protocol, Src Port: 5060 (5060), Dst Port: 5060 (5060)

    □ Session Initiation Protocol (REGISTER)

   ■ Message Header
     From: <sip:3402000001320000001@3402000000>:tag=1954425189
     Call-ID: 1010483685

    ⊕ CSeq: 1 REGISTER

    ⊕ Contact: <sip:34020000001320000001@192.168.1.65:5060>

       Max-Forwards: 70
       User-Agent: IP Camera
       Expires: 3600
      Content-Length: 0
```

图3 具体注册消息图

重要是Cantact信息,包含了摄像机GB28181 SIP ID 以及IP地址和端口号,这样与摄像机通信的SIP服务就知道往哪里回应答消息。

摄像机端基本介绍了完了(摄像机端相当于SIP Client),下面介绍CG28181 服务端也即 SIP Server,这正是我们要实现的。

实现CG28181服务端可以借助于现有的开源库 PJSIP,自己实现开发量还是很大的,具体的实现步骤如下:

一. 将PJSIP运行起来,毕竟人家是一个服务。只有运行以后才能接收客户端发来的消息。

```
bool Init(std::string concat, int logLevel)
{
    this->concat = concat;
    pj_log_set_level(logLevel);
    auto status = pj_init();

    status = pjlib_util_init();

    pj_caching_pool_init(&cachingPool, &pj_pool_factory_default_policy, 0);

status = pjsip_endpt_create(&cachingPool.factory, nullptr, &endPoint);

status = pjsip_endpt_create(&cachingPool.factory, nullptr, &endPoint);
```

```
13
     status = pjsip_tsx_layer_init_module(endPoint);
14
15
     status = pjsip ua init module(endPoint, nullptr);
16
17
     pool = pj_pool_create(&cachingPool.factory, "proxyapp", 4000, 4000, nullptr);
       auto pjStr =StrToPjstr(GetAddr());
18
19
20
     pj sockaddr in pjAddr;
21
     pjAddr.sin family = pj AF INET();
22
       pj inet aton(&pjStr, &pjAddr.sin addr);
23
24
       auto port = GetPort();
25
     pjAddr.sin_port = pj_htons(static_cast<pj_uint16_t>(GetPort()));
26
          status = pjsip_udp_transport_start(endPoint, &pjAddr, nullptr, 1, nullptr);
27
         if (status != PJ SUCCESS) return status;
28
29
         auto realm = StrToPjstr(GetLocalDomain());
30
         return pjsip auth srv init(pool, &authentication, &realm, lookup, 0) == PJ SUCCESS ? true : false;
31
32 }
```

以上是PJSip初始化的代码,需要将服务将要监听的端口传给PJSIP,这样服务就在监听的端口接收SIP 消息了。

二. 应答注册消息

摄像机端发送来Register消息后,如果服务端不应答,摄像机端会一直发送直到收到服务端应答为止。如果服务器端重新运行,需要手动再次

开启摄像机,如果等摄像机自己再次发送注册消息可能是一个小时以后,我们当然不希望那么久。

服务端应答注册消息代码

```
1 | bool OnReceive(pjsip rx data* rdata) override
2
3
        if(rdata->msg info.cseq->method.id == PJSIP REGISTER METHOD)
           auto expires = static_cast<pjsip_expires_hdr*>(pjsip_msg_find_hdr(rdata->msg_info.msg, PJSIP_H_EXPIRES, nu
           auto authHdr = static_cast<pjsip_authorization_hdr*>(pjsip_msg_find_hdr(rdata->msg_info.msg, PJSIP_H_AUTHC
           if(expires && expires->ivalue > 0 )
           {
9
           if(authHdr)
10
11
               cout <<"receive register info"<<endl;</pre>
12
               response(rdata, PJSIP_SC_OK, DateHead);
13
               QureryDeviceInfo(rdata);
14
           }
15
            else
16
17
               response(rdata, PJSIP_SC_UNAUTHORIZED, AuthenHead);
18
19
            return true;
20
21
22
        return false;
23 }
```

OnReceive 是服务端接收注册消息以后的响应方法,也就是说要将OnReceive作为入参传给PJSIP,完成此项功能在初始化PJSIP Moudle时。至于PJSIP moudle,这里不多解释,想要知道细节的话,可以查看PJSIP文档,文档群里有,代码如下:

```
1 | bool Init(std::string concat, int loglevel)
2
3
       bool ret = false;
     if(!mainModule)
     ret = context.Init(concat,loglevel);
       if(!ret) return ret;
9
       static struct pjsip_module moudle =
10
11
           nullptr, nullptr,
12
         { "MainModule", 10 },
13
         -1,
14
      PJSIP_MOD_PRIORITY_APPLICATION,
15
        nullptr,
16
        nullptr,
17
        nullptr,
18
        nullptr,
19
       nullptr,
20
     &CGSipMedia::OnReceive,
21
       nullptr,
22
       nullptr,
23
       nullptr,
24
     } ;
25
     mainModule = &moudle;
26
    pjsip_inv_callback callback;
27
       pj_bzero(&callback, sizeof(callback));
28
     callback.on_state_changed = &onStateChanged;
29
     callback.on_new_session = &onNewSession;
30
     callback.on_tsx_state_changed = &onTsxStateChanged;
     callback.on_rx_offer = &onRxOffer;
32
     callback.on_rx_reinvite = &onRxReinvite;
33
     callback.on_create_offer = &onCreateOffer;
34
     callback.on_send_ack = &onSendAck;
35
     ret = context.RegisterCallback(&callback);
36
       if(!ret ) return ret;
37
38
     context.InitModule();
39
     ret = context.RegisterModule(mainModule);
40
       if(!ret ) return ret;
41
42
     CGSipModule::GetInstance().Init();
     ret = context.CreateWorkThread(&proc,workthread,nullptr,"proxy");
43
44
45
       return ret;
46
```

void Response(pjsip_rx_data* rdata, int st_code,int headType)
{
 std::lock_guard<mutex> lk(lock);
 pjsip_tx_data* tdata;
 pjsip_endpt_create_response(endPoint, rdata, st_code, nullptr, &tdata);
 auto date = DateTimeFormatter::format(LocalDateTime(), "%Y-%m-%dT%H:%M:%S");

OnReceive方法内Resonse方法实现了发送响应数据到客户端(摄像机):

```
pj str t c;
     pj str t key;
     pjsip hdr *hdr;
     switch(headType)
           case DateHead:
             key = pj_str("Date");
              hdr = reinterpret cast<pjsip hdr*>(pjsip date hdr create(pool, &key, pj cstr(&c, date.c str())));
              pjsip msg add hdr(tdata->msg, hdr);
           case AuthenHead:
              pjsip_auth_srv_challenge(&authentication, nullptr, nullptr, nullptr, PJ_FALSE, tdata);
              default:
               break;
       pjsip response addr addr;
       pjsip get response addr(pool, rdata, &addr);
       pjsip_endpt_send_response(endPoint, &addr, tdata, nullptr, nullptr);
      实际也就是利用发PJSIP发送一些字符串给客户端。具体发送了些什么,可以抓个包看下。
3335 2017-09-17 15:09:51.7092830192.168.1.65
                                      192,168,1,102
                                                          433 Request: REGISTER sip:3402000000200000001@3402000000 (remove 1 binding) |
3383 2017-09-17 15:09:58.1738520192.168.1.65
                                                          192.168.1.102
                                                   SIP
3384 2017-09-17 15:09:58.1740940192.168.1.102
                                      192.168.1.65
                                                          459 Status: 401 Unauthorized |
                                                          666 Request: REGISTER sip:340200000020000001@3402000000 (1 binding) |
3385 2017-09-17 15:09:58.1840720192.168.1.65
                                      192, 168, 1, 102
                                                   STP
3386 2017-09-17 15:09:58.1843230192.168.1.102
                                                          361 Status: 200 OK (0 bindings) |
                                      192.168.1.65
                                                   SIP
                                                                     图4 SIP服务应答注册消息
SIP 服务实际回了"200 OK" 给摄像机端。看下具体的消息内容:
■ Frame 3386: 361 bytes on wire (2888 bits), 361 bytes captured (2888 bits) on interface (
⊕ Ethernet II, Src: 98:54:1b:a2:82:b7 (98:54:1b:a2:82:b7), Dst: a4:14:37:e0:f6:d9 (a4:14:37:e0:f6:d9)
⊕ Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst: 192.168.1.65 (192.168.1.65)
User Datagram Protocol, Src Port: 5060 (5060), Dst Port: 5060 (5060)

    ∃ Session Initiation Protocol (200)

  ⊕ Status-Line: SIP/2.0 200 OK
  ■ Message Header

□ Via: SIP/2.0/UDP 192.168.1.65:5060; rport=5060; received=192.168.1.65; branch=z9hG4bK57214567

        Transport: UDP
        Sent-by Address: 192.168.1.65
        Sent-by port: 5060
        RPort: 5060
        Received: 192.168.1.65
        Branch: z9hG4bK57214567
      call-ID: 1220665556
    □ From: <sip:34020000001320000001@3402000000>;tag=1035741514

■ SIP from address: sip:34020000001320000001@3402000000
        SIP from tag: 1035741514
    □ To: <sip:34020000001320000001@3402000000>;tag=z9hG4bK57214567
      SIP to tag: z9hG4bK57214567

    □ CSeq: 2 REGISTER

        Sequence Number: 2
        Method: REGISTER
      Date: 2017-09-17T15:09:58
      Content-Length: 0
                图5 "200 OK" 具体内容
   SIP服务端响应注册命令后,发送Invite请求,请求catalog信息,也就是设备基本信息,具体的方法上面已
给出,具体的内容是:
      void QueryDeviveInfo(GBDevice *device, const string& scheme = "Catalog")
  2
         char szQuerInfo[200] = { 0 };
         pj_ansi_snprintf(szQuerInfo, 200,
```

```
"<?xml version=\"1.0\" encoding=\"UTF-8\"?>\n"
        "<Query>\n"
       "<CmdType>%s</CmdType>\n"
       "<SN>17430</SN>\n"
       "<DeviceID>%s</DeviceID>\n"
 10
       "</Query>\n", scheme.c_str(), device->GetUser()
 11
 12
        pjsip tx data *tdata;
 13
        const pjsip method method = { PJSIP OTHER METHOD,{ "MESSAGE", 7 } };
 14
        auto text = StrToPjstr(string(szQuerInfo));
 15
        pjsip endpt create request(endPoint, &method, &StrToPjstr(device->GetSipIpUrl()), &StrToPjstr(concat), &StrToP
 16
        tdata->msg->body->content_type.type = pj_str("Application");
 17
        tdata->msg->body->content_type.subtype = pj_str("MANSCDP+xml");
 18
        pjsip_endpt_send_request(endPoint, tdata, -1, nullptr, nullptr);}
 SIP服务端 发送了请求catalog 消息,摄像机端收到消息发送其自身的catalog消息,SIP 服务端将在OnReceive中收到具体的catalog消
息。取catalog消息的方法如下:
  1 | bool OnReceive(pjsip rx data* rdata) override
  2
        if (rdata->msg info.cseq->method.id == PJSIP OTHER METHOD)
  4
  5
         CGXmlParser xmlParser(context.GetMessageBody(rdata));
      CGDynamicStruct dynamicStruct;
      dynamicStruct.Set(xmlParser.GetXml());
  8
  9
         auto cmd = xmlParser.GetXml()->firstChild()->nodeName();
 10
         auto cmdType = dynamicStruct.Get<std::string>("CmdType");
 11
         if (cmdType != "Catalog") return false;
 12
 13
         auto DeviceID = dynamicStruct.Get<std::string>("DeviceID");
 14
 15
      Vector deviceList = dynamicStruct.Get<Vector>("DeviceList");
 16
 17
         for (auto& x : deviceList)
 18
 19
            CGCatalogInfo devinfo;
 20
         try
 21
 22
            devinfo.PlatformAddr = rdata->pkt info.src name;
 23
            devinfo.PlatformPort = rdata->pkt info.src port;
 24
 25
            devinfo.Address = x["Address"].convert<string>();
 26
            devinfo.Name = WstringToString(x["Name"].convert<wstring>());
 27
            devinfo.Manufacturer = x["Manufacturer"].convert<string>();
 28
            devinfo.Model = x["Model"].convert<string>();
 29
            devinfo.Owner = x["Owner"].convert<string>();
 30
            devinfo.Civilcode = x["CivilCode"].convert<string>();
 31
            devinfo.Registerway = x["RegisterWay"].convert<int>();
 32
            devinfo.Secrecy = x["Secrecy"].convert<int>();
 33
            //devinfo.IPAddress = x["IPAddress"].convert<string>();
 34
            devinfo.DeviceID = x["DeviceID"].convert<string>();
 35
            devinfo.Status= x["Status"].convert<string>();
 36
         }
 37
         catch (...)
 38
 39
             //continue;
 40
 41
         if(callback)
```

SIP服务取都摄像机的信息后就可以发送请求视频信息了,请求视频最为关键的是SDP,下面看下SDP信息如何填写:

```
1 | static string createSDP(MediaContext& mediaContext)
2 {
3
       char str[500] = { 0 };
       pj_ansi_snprintf(str, 500,
        "v=0\n"
        "o=%s 0 0 IN IP4 %s\n"
        "s=Play\n"
        "c=IN IP4 %s\n"
        "t=0 0\n"
10
        "m=video %d RTP/AVP 96 98 97\n"
11
        "a=recvonly\n"
12
        "a=rtpmap:96 PS/90000\n"
13
        "a=rtpmap:98 H264/90000\n"
14
        "a=rtpmap:97 MPEG4/90000\n"
15
        "y=0100000001\n",
     mediaContext.GetDeviceId().c_str(),
16
17
     mediaContext.GetRecvAddress().c_str(),
     mediaContext.GetRecvAddress().c_str(),
18
19
     mediaContext.GetRecvPort()
20
             ) ;
21
        return str;
22 }
```

发送请求视频命令到摄像机端当然也是通过PJSIP API实现代码如下:

```
1 bool Invite(pjsip_dialog *dlg, MediaContext mediaContext, string sdp)
  2
              pjsip_inv_session *inv;
                       if (PJ_SUCCESS != pjsip_inv_create_uac(dlg, nullptr, 0, &inv)) return false;
               pjsip_tx_data *tdata;
                      if (PJ_SUCCESS != pjsip_inv_invite(inv, &tdata)) return false;
                pjsip_media_type type;
                type.type = pj_str("application");
                type.subtype = pj_str("sdp");
 10
                       auto text = pj_str(const_cast<char *>(sdp.c_str()));
11
                        try
12
13
                     tdata->msg->body = pjsip_msg_body_create(pool, &type.type, &type.subtype, &text);
14
15
                                     auto hName = pj_str("Subject");
16
                                     auto subjectUrl = mediaContext.GetDeviceId() + ":" + SiralNum + "," + GetInstance().GetCode() + ":" + SiralNum + "," + GetInstance() + GetI
17
                                     auto hValue = pj_str(const_cast<char*>(subjectUrl.c_str()));
 18
                                    auto hdr = pjsip_generic_string_hdr_create(pool, &hName, &hValue);
19
                                    pjsip_msg_add_hdr(tdata->msg, reinterpret_cast<pjsip_hdr*>(hdr));
 20
                                    pjsip_inv_send_msg(inv, tdata);
 21
 22
                         catch (...)
 23
```

24 }
25 return true;
26 }

代码就不解释了,要想知道到底发了什么还是抓个包看看,无论你用什么方法只要抓包的数据是正确定说明发送成功了。

■ 88 2017-09-24 14:41:44.445190000 192.168.1.102 192.168.1.65 SIP/SDP 871 Request: INVITE sip:34020000001320000001@192.168.1.65:5060 m Frame 88: 871 bytes on wire (6968 bits), 871 bytes captured (6968 bits) on interface 0 Ethernet II, Src: 98:54:1b:a2:82:b7 (98:54:1b:a2:82:b7), Dst: a4:14:37:e0:f6:d9 (a4:14:37:e0:f6:d9) H Internet Protocol version 4, Src: 192.168.1.102 (192.168.1.102), Dst: 192.168.1.65 (192.168.1.65) ⊕ User Datagram Protocol, Src Port: 5060 (5060), Dst Port: 5060 (5060) ∃ Session Initiation Protocol (INVITE) ■ Via: SIP/2.0/UDP 192.168.1.102:5060; rport; branch=z9hG4bKPj1e067c9273d841e1a078f4e60ce785d6 Max-Forwards: 70 ⊞ From: sip:34010000002000000001@192.168.1.102:5060;tag=8ec01bc99a884aae9f4f3111bfe10453 ⊕ To: sip:34020000001320000001@192.168.1.65:5060 ① Contact: <sip:3401000000200000001@192.168.1.102:5060> call-ID: d773a28cfef24aa19ca751ed6adaf60e Allow: INVITE, ACK, BYE, CANCEL, UPDATE, PRACK Supported: 100rel subject: 3402000001320000001:015359105,3401000000200000001:015359105 Content-Type: application/sdp Content-Length: 210 ■ Message Body ∃ Session Description Protocol Session Description Protocol Version (v): 0 ⊕ Owner/Creator, Session Id (o): 34020000001320000001 0 0 IN IP4 192.168.1.102 Session Name (s): Play ⊕ Connection Information (c): IN IP4 192.168.1.102 ⊕ Time Description, active time (t): 0 0 ⊞ Media Description, name and address (m): video 6000 RTP/AVP 96 98 97 Media Attribute (a): recvonly Media Attribute (a): rtpmap:96 PS/90000 ⊕ Media Attribute (a): rtpmap:98 H264/90000 Media Attribute (a): rtpmap:97 MPEG4/90000

图6 服务端发送invite视频消息

摄像机端收到Invite请求后,会将视频数据以rtp的方式推送到指定的端口,端口在invite消息指定。

这样在指定的地址 (ip + port) 就可以拿到数据了。

最后提供一个测试demo, demo的作用是可以让大家抓包,看看双方都发了些什么。

demo运行界面如下:



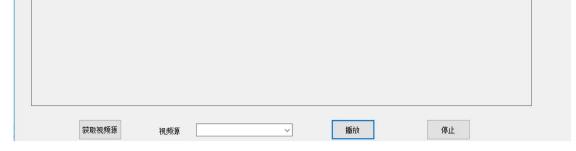


图6 demo运行初始界面

- 1.运行demo后,首先配置好配置,如果不知道可以默认,但IP地址需要修改,端口不能被占用。
- 2.完成配置各配置项以后点击获取视频源按钮等待摄像机端注册。
- 3.摄像机端开启28181功能:具体的方法可以是:平台选择方式下拉框先选择一个非28181方式,点击保存,再选择28181方式并点击保存。
- 4.摄像机端成功开启28181功能以后,视频源下拉框中会显示摄像机的名称信息。
- 5.选中视频源下拉框中出现的选项并点击播放按钮,正常情况下会可以播放从摄像机端过来的视频流。

成功接入视频源并播放的运行界面如下。

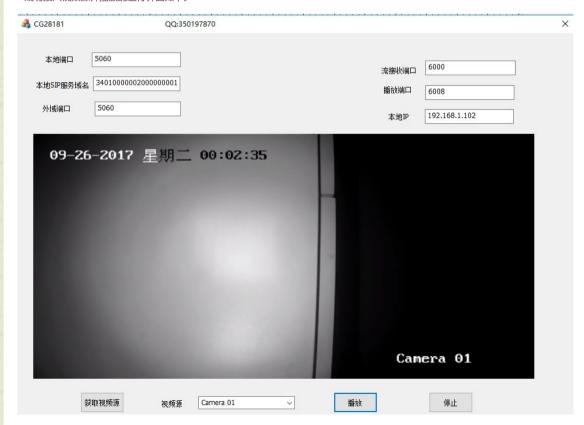


图7 demo成功运行以后的界面

Demo 可以在群里下载。 如需交流,可以加QQ群766718184,或者QQ:350197870 视频教程播放地址: http://www.igiyi.com/u/1426749687 Demo下载地址: http://www.chungen90.com/index.php?m=text&a=index&classify_id=207 视频下载地址: http://www.chungen90.com/index.php?m=text&a=index&classify_id=208 转载于:https://www.cnblogs.com/wanggang123/p/7507897.html 相关资源:基于gb28181协议视频接入包.zip gb28181java,gb28181协议对接方案... JGB28181:基于Java实现的GB28181平台-源码 JGB28181 基于Java实现的GB28181平台。 使用指南修改config.properties文件中的配置信息,编译运行即可。 功能更新日志 2020.3.25 注册;恢复 目... GB28181视频流源代码,工程完整可运行 05-29 本文档包含GB28181视频流协议的完整VS工程,工程运行后自动加载一段文档内的视频文件,按GB28181视频流传输到后台。在工程运行前需要在源代... 参与评论 请先登录后发表评论~ 国标GB28181视频流对接以及媒体服务器实现 chunzheng08... 国标GB28181视频流对接以及媒体服务器实现视频流对接采用pjproject相关库实现sip服务器,采用pjmedia实现视频流接收。媒体服务器完全自研,媒体服... ...公安网内网如何通过国标GB28181协议将视频流对接至... 在公安内网部署国标EasyGBS视频平台,大华和海康的平台通过GB28181协议级联到EasyGBS服务中,在网闸中开启取流端口,并且需要在公网部署一套Eas... GB28181国标28181的JAVA注册实现代码 最近用JAVA的SIP协议写了一个GB28181平台的对接,并成功完成了海康、大华、中威等设备,更重要的是海康平台、公安一所平台的对接。因为行业内... 国标GB28181摄像头直播视频流媒体服务器获取视频流失败问题分析 weixin 43194037的博客 **②** 800 国标28181协议全称为GB/T28181《安全防范<mark>视频</mark>监控联网系统信息传输、交换、控制技术要求》,是由公安部科技信息化局提出,由全国安全防范报警.. 直播流、视频文件转GB28181协议与国标平台对接_jinlong... Onvif/RTSP流媒体服务LiveNVR Onvif/RTSP流媒体服务,支持RTSP稳定拉流接入,支持Onvif协议接入,支持RTMP/HLS/HTTP-FLV/RTSP/Websocket-FLV/... 国标GB28181视频流媒体服务解决方案EasyGBS如何对接摄像机NVR视频流 GB/T28181协议从本质上说和ONVIF都是一样的,目的都是为了降低视频监控设备互联的难度。该协议都是基于IP网络,如果要对接,需要有相关的协议转换... gb28181开发的一些心得 zhoumsl的博客 ① 1万+ gb28181中的注册的实现 国标GB28181介绍 weixin_38746576的博客 ① 2万+ 一. 国标的由来 GB28181国标解决平台与平台<mark>对接</mark>问题 比如A平台大连交警系统需要看B平台如:南京,上海交警系统的<mark>视频</mark>。需要<mark>对接</mark>过来,实现调度.. 国标流媒体服务器如何通过GB28181协议SIP获取视频流?_E...

国标流媒体服务器是基于GB/T28181协议进行模块化设计、支持分布式部署的高稳定流媒体服务器,具有设备管理模块、信令模块、流媒体模块:支持多个













