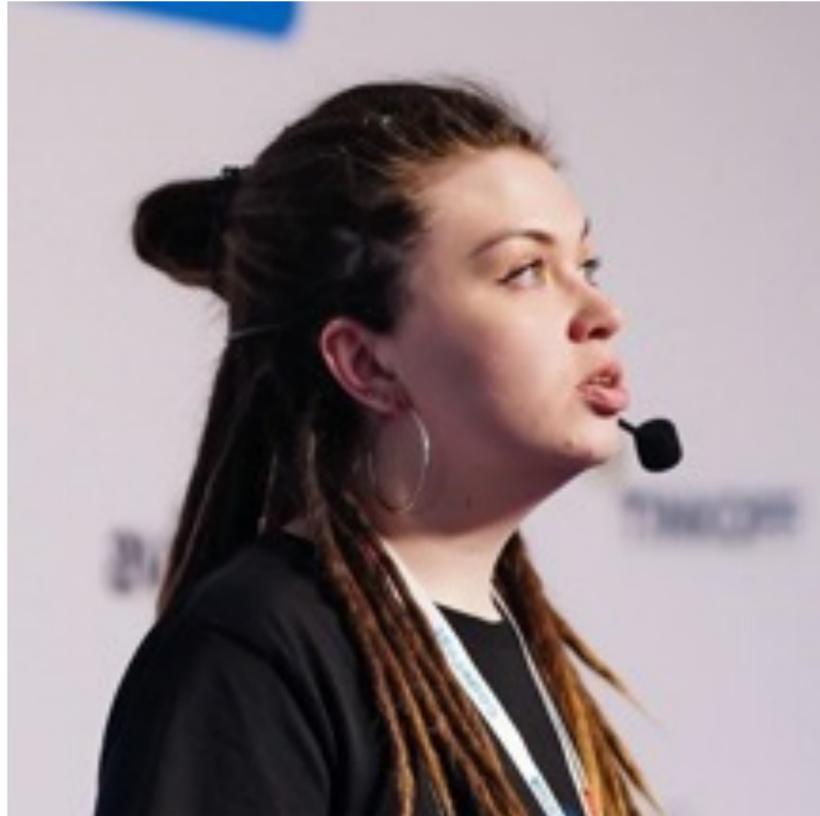


Тестируем воздух: беспроводные устройства умного дома с протоколом Zigbee

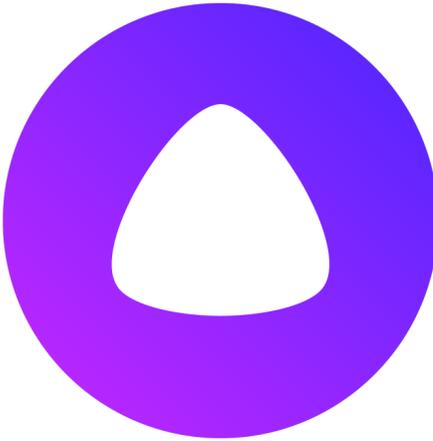
Башев Дмитрий, инженер по тестированию
Осенникова Клавдия, инженер по тестированию



Башев Дмитрий, QA-инженер в команде умных колонок

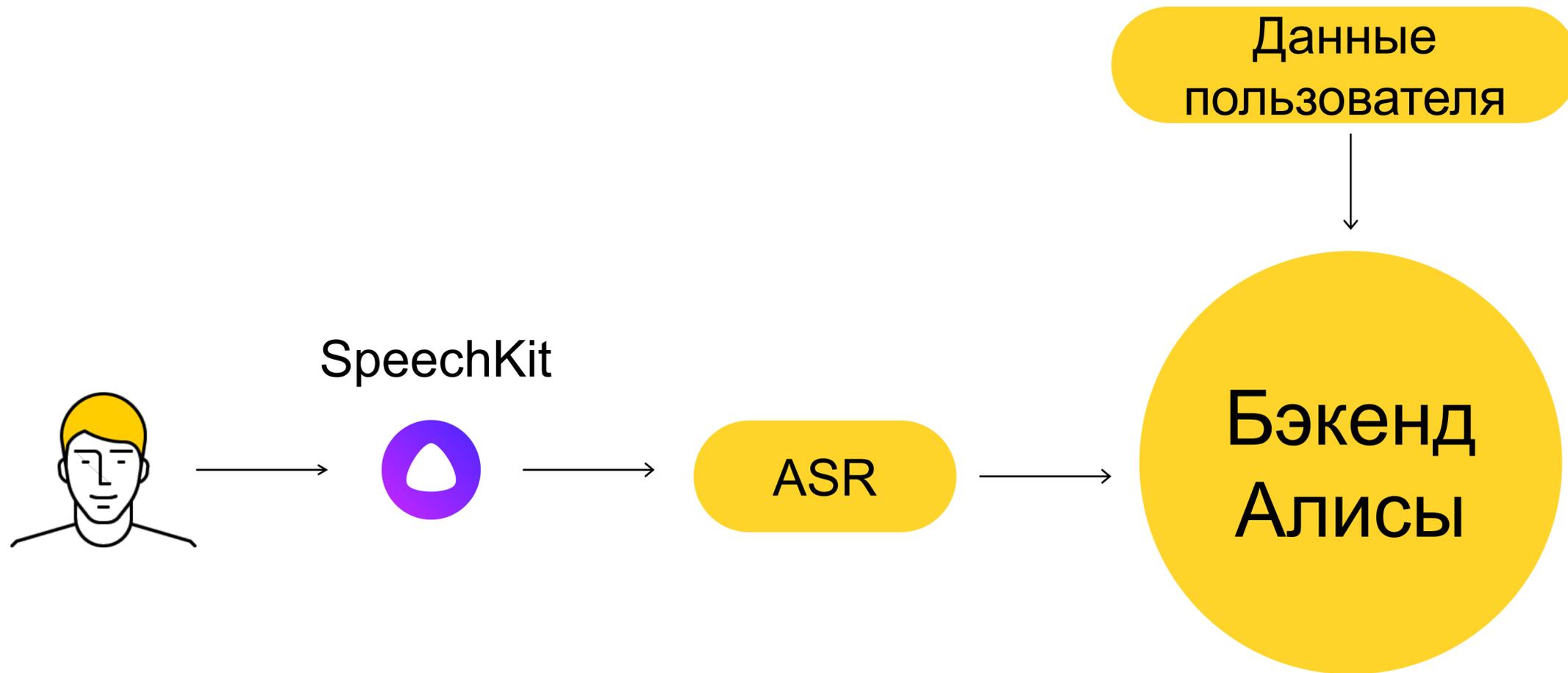


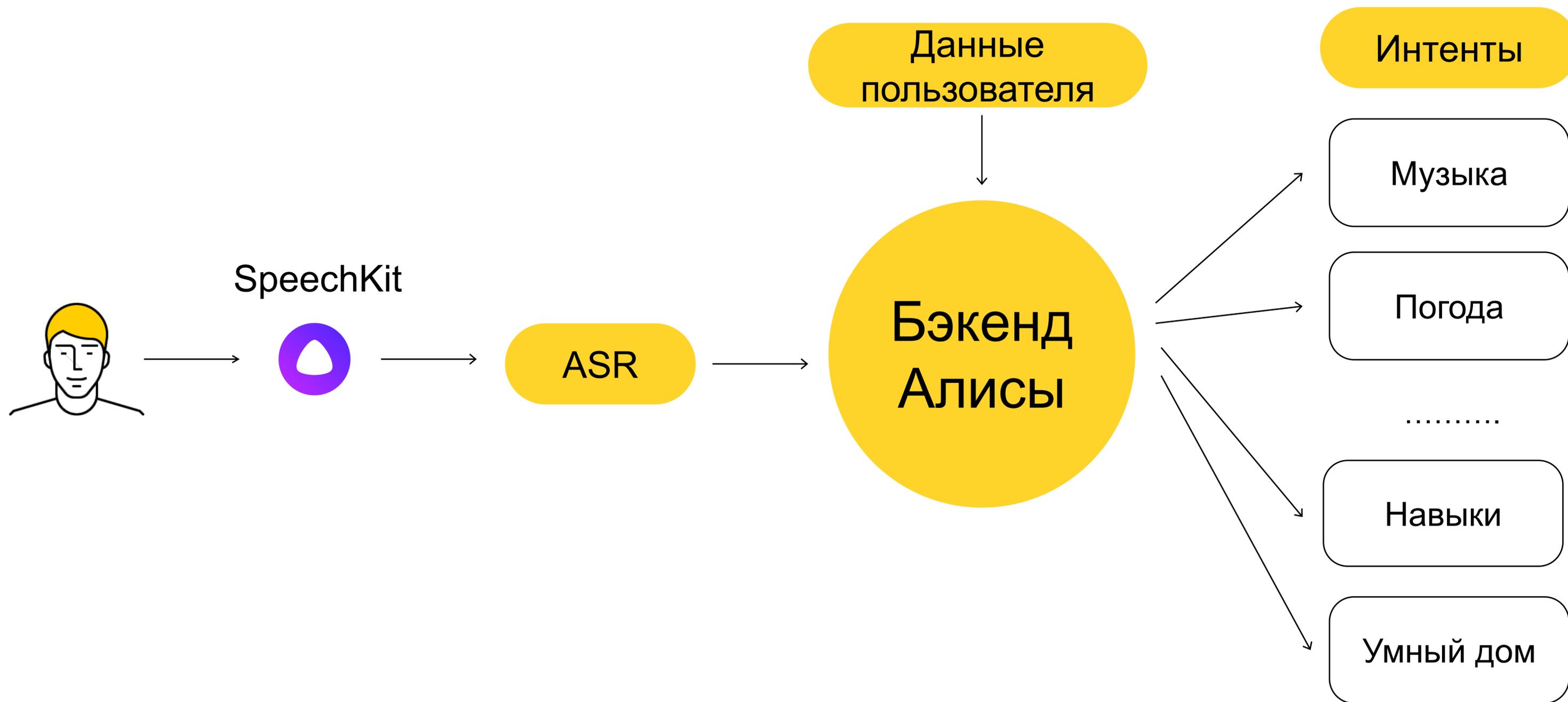
Осенникова Клавдия, QA-инженер в команде умного дома

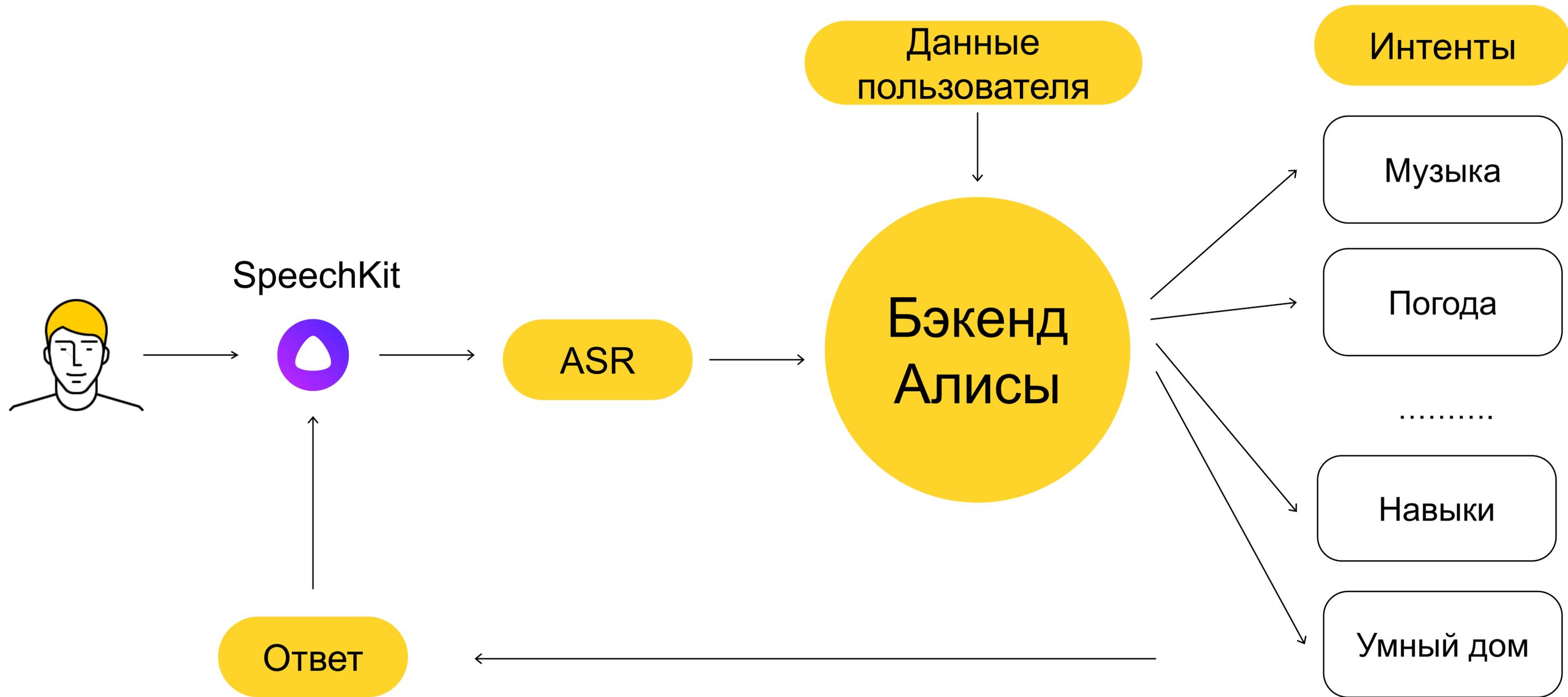


SpeechKit

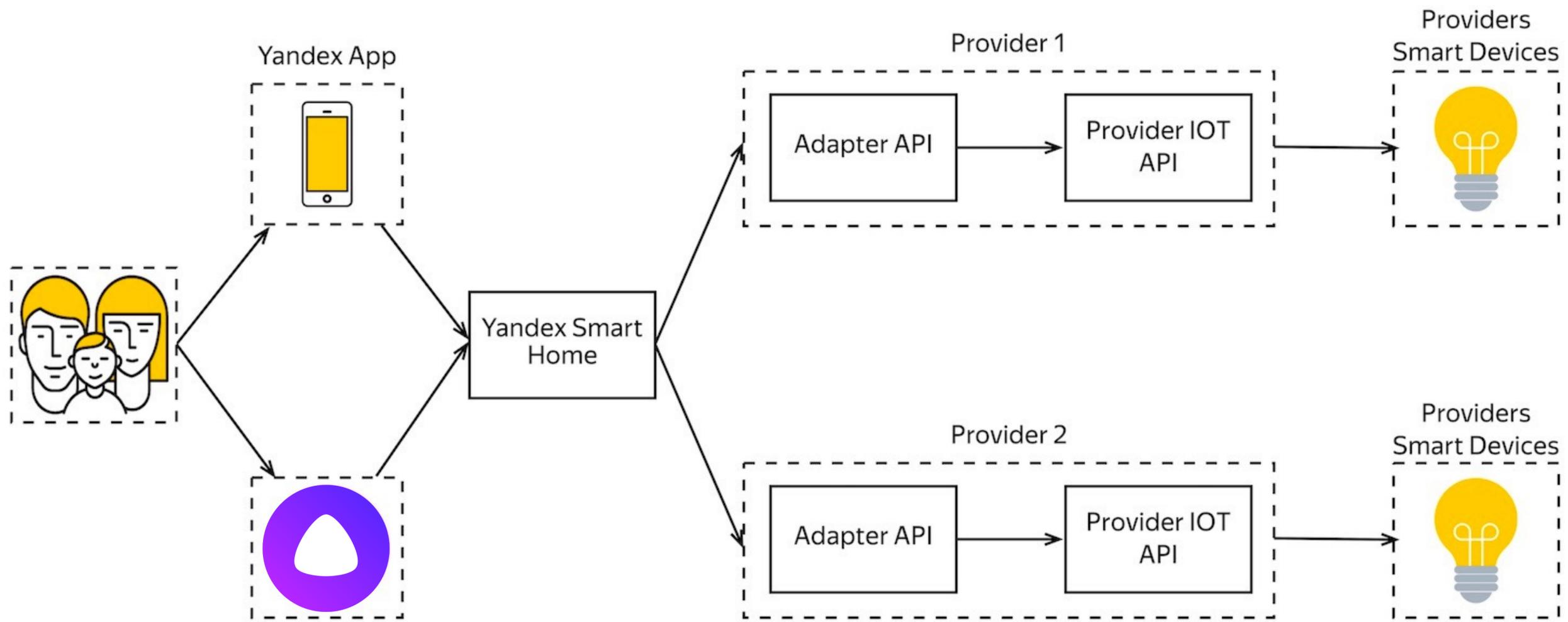








TTS + действие + сайд-эффект

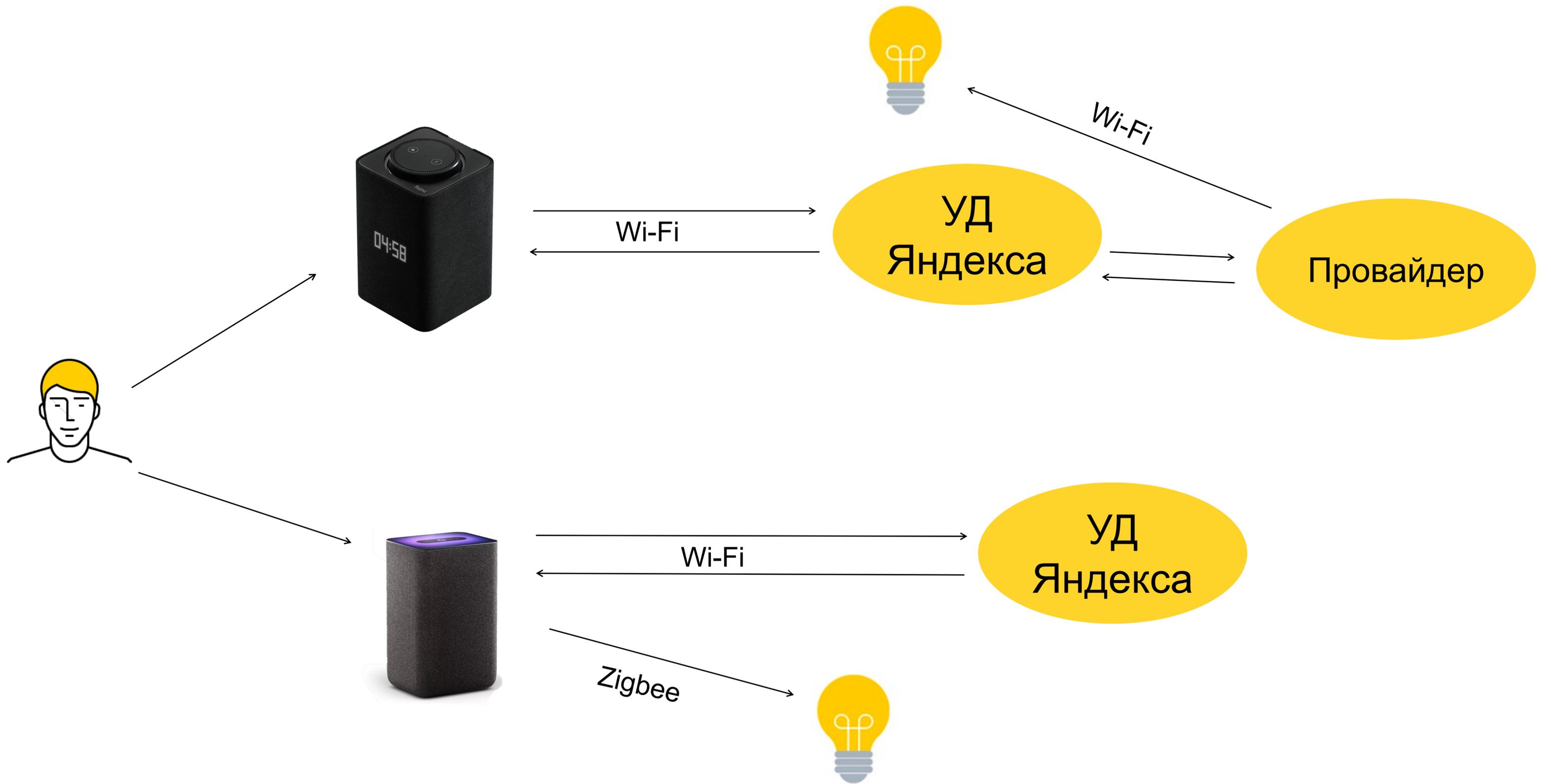




Zigbee

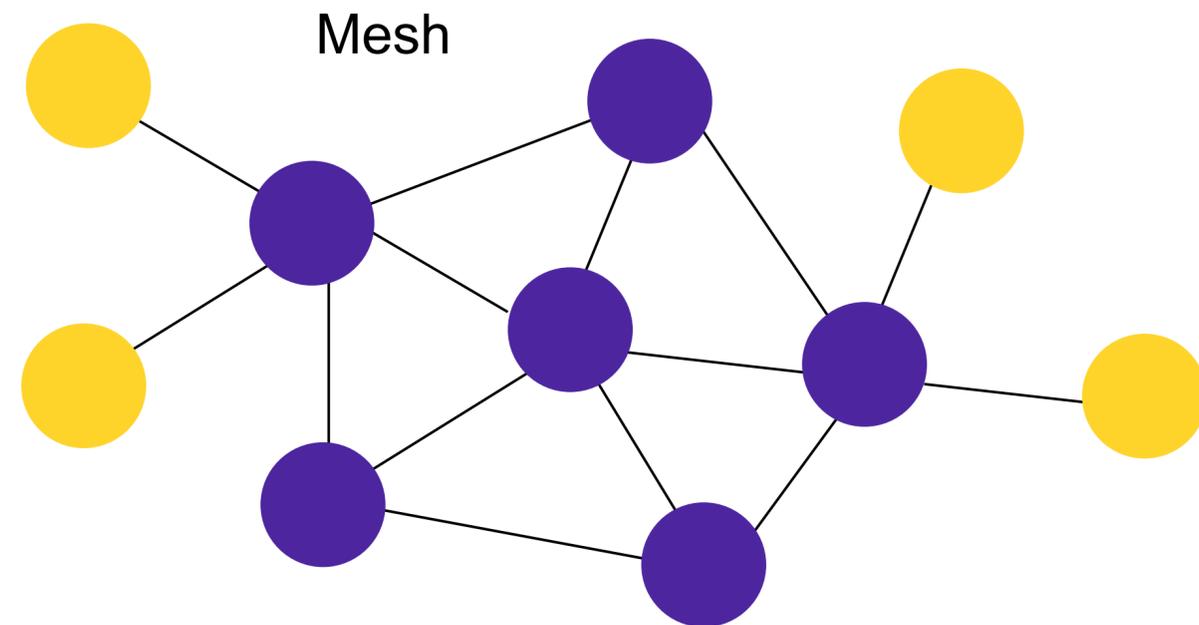
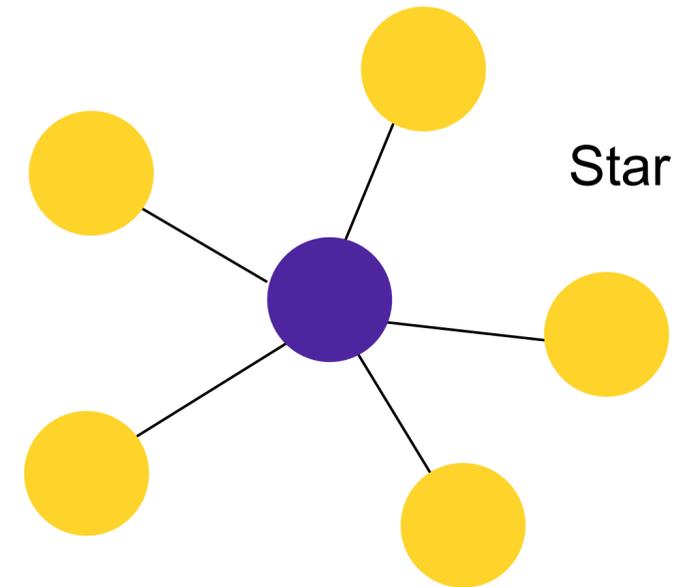
Zigbee – протокол беспроводной передачи данных, который работает аналогично другим беспроводным технологиям, но имеет ряд преимуществ

- низкое энергопотребление
- колонка (хаб) общается напрямую
- большое количество устройств



Zigbee протокол

- позволяет делать mesh сеть
- область покрытия больше



Zigbee протокол

- более свободный эфир

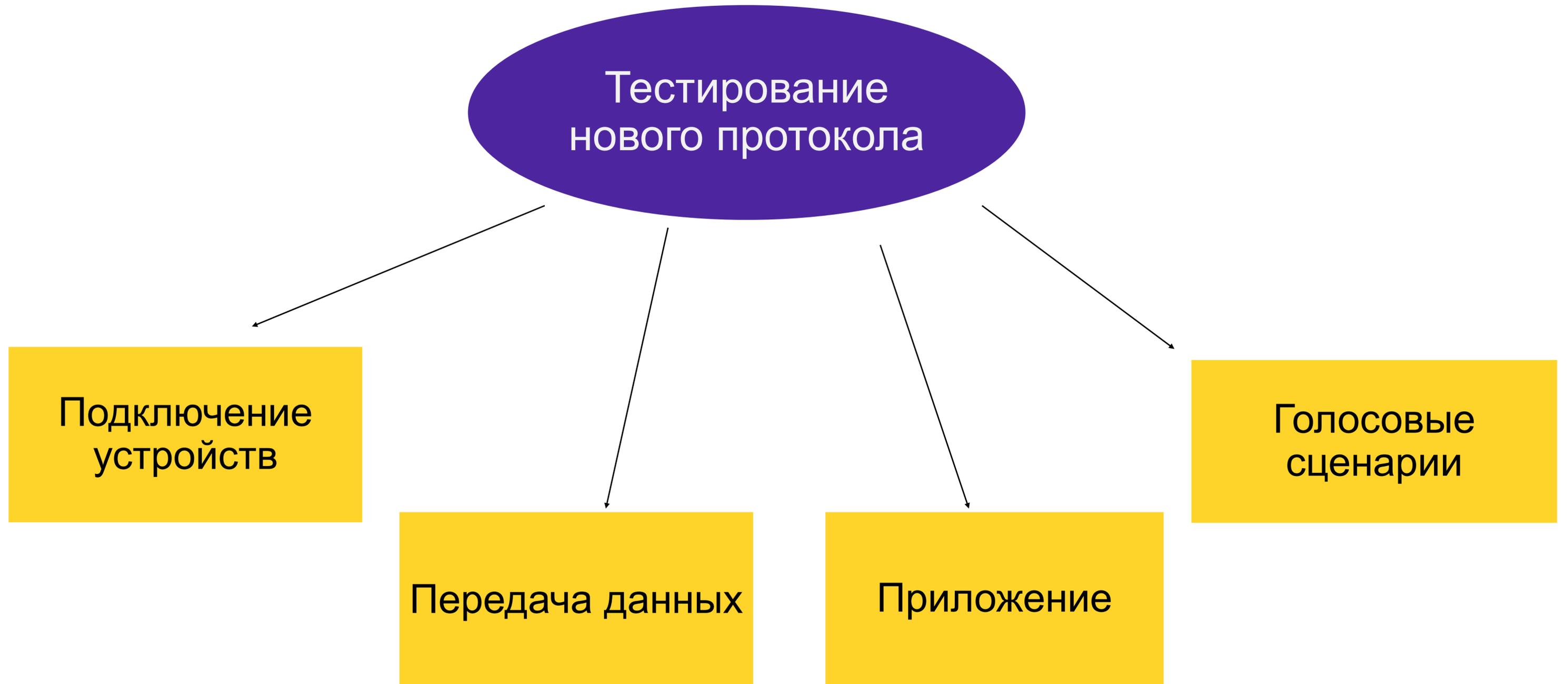


Почему ещё это важно для умного дома?



- позволяет гибко настраивать устройства
- большое количество устройств

Что и как тестировали



Подключение устройств

1) Проверки процесса подключения

```
[1444:2035] [2022-10-04 15:39:38.612] [zigbee] [info] [network.cpp:197] onNetworkOpen: 1
[1444:2035] [2022-10-04 15:39:38.612] [zigbee_capability] [info] [zigbee_capability.cpp:990] onNetworkOpened
[1444:2058] [2022-10-04 15:39:40.272] [zigbee] [debug] [callbacks.cpp:70] ezspChildJoinHandler: index 0 joining 1 childId 0x32a4 childEui64 0x72E98302008D1500 childType 4
[1444:2058] [2022-10-04 15:39:40.776] [zigbee] [debug] [callbacks.cpp:159] ezspTrustCenterJoinHandler: newNodeId 0x32a4 newNodeEui64 0x72E98302008D1500 status 1 policyDecision 0 parentOfNewNodeId 0x0000
[1444:2058] [2022-10-04 15:39:40.990] [zigbee] [debug] [callbacks.cpp:110] ezspPollHandler: childId 0x32a4
[1444:2058] [2022-10-04 15:39:41.055] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4 profile 0x0000 cluster 0x0013 srcEp 0 dstEp 0 opts 0x0100 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [debug] [silabs_ncp.cpp:164] ZDO message: nodeId 0x32a4 clusterId 0x0013 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [info] [network.cpp:227] onDeviceAnnounce: nodeId 0x32a4 eui64 0x72E98302008D1500 capability 0x80
[1444:2025] [2022-10-04 15:39:41.055] [zigbee_capability] [info] [zigbee_capability.cpp:1001] onNodeJoined 0x72E98302008D1500
[1444:2058] [2022-10-04 15:39:41.103] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4 profile 0x0104 cluster 0x0000 srcEp 1 dstEp 1 opts 0x0100 data 0x18000A050042136C756D692E72656D6F74652E623161636E303101002002
[1444:2035] [2022-10-04 15:39:41.103] [zigbee] [info] [network.cpp:355] onZclMessage: nodeId=0x32a4 endpoint=1, profileId=0x0104, clusterId=0x0000, header=(frameControl=0x18[frameType=global, direction=server_to_client], manufacturerCode=0x0000, transactionSequenceNumber=0x00, commandId=0x0a), payload=0x050042136C756D692E72656D6F74652E623161636E303101002002, payloadSize=27
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:240] Fetching device info
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:344] ApplicationVersion 2
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:364] ModelIdentifier lumi.remote.b1acn01
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [debug] [zigbee_capability.cpp:1057] Device 0x72E98302008D1500 ready
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:1060] Device limit reached, finishing discovery
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:492] finishDiscovery. discoveryRequestId=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discoveryRequestId_=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discovered 1 endpoints
```

Подключение устройств

1) Проверки процесса подключения

```
[info] [zigbee_capability.cpp:990] onNetworkOpened
```

```
[1444:2035] [2022-10-04 15:39:38.612] [zigbee_capability] [info] [zigbee_capability.cpp:990] onNetworkOpened
[1444:2058] [2022-10-04 15:39:40.272] [zigbee] [debug] [callbacks.cpp:70] ezspChildJoinHandler: index 0 joining 1 childId 0x32a4 childEui64 0x72E98302008D1500 childType 4
[1444:2058] [2022-10-04 15:39:40.776] [zigbee] [debug] [callbacks.cpp:159] ezspTrustCenterJoinHandler: newNodeId 0x32a4 newNodeEui64 0x72E98302008D1500 status 1 policyDecision 0 parentOfNewNodeId 0x0000
[1444:2058] [2022-10-04 15:39:40.990] [zigbee] [debug] [callbacks.cpp:110] ezspPollHandler: childId 0x32a4
[1444:2058] [2022-10-04 15:39:41.055] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4 profile 0x0000 cluster 0x0013 srcEp 0 dstEp 0 opts 0x0100 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [debug] [silabs_ncp.cpp:164] ZDO message: nodeId 0x32a4 clusterId 0x0013 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [info] [network.cpp:227] onDeviceAnnounce: nodeId 0x32a4 eui64 0x72E98302008D1500 capability 0x80
[1444:2025] [2022-10-04 15:39:41.055] [zigbee_capability] [info] [zigbee_capability.cpp:1001] onNodeJoined 0x72E98302008D1500
[1444:2058] [2022-10-04 15:39:41.103] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4 profile 0x0104 cluster 0x0000 srcEp 1 dstEp 1 opts 0x0100 data 0x18000A050042136C756D692E72656D6F74652E623161636E303101002002
[1444:2035] [2022-10-04 15:39:41.103] [zigbee] [info] [network.cpp:355] onZclMessage: nodeId=0x32a4 endpoint=1, profileId=0x0104, clusterId=0x0000, header=(frameControl=0x18[frameType=global, direction=server_to_client], manufacturerCode=0x0000, transactionSequenceNumber=0x00, commandId=0x0a), payload=0x050042136C756D692E72656D6F74652E623161636E303101002002, payloadSize=27
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:240] Fetching device info
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:344] ApplicationVersion 2
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:364] ModelIdentifier lumi.remote.b1acn01
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [debug] [zigbee_capability.cpp:1057] Device 0x72E98302008D1500 ready
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:1060] Device limit reached, finishing discovery
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:492] finishDiscovery. discoveryRequestId=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discoveryRequestId_=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discovered 1 endpoints
```

Подключение устройств

1) Проверки процесса подключения

```
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:70] ezspChildJoinHandler: index 0 joining 1
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:159] ezspTrustCenterJoinHandler: newNodeId 0x0000
[1444:2058] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:110] ezspPollHandler: childId 0x32a4
[1444:2058] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [debug] [silabs_ncp.cpp:164] ZDO message: nodeId 0x32a4 clusterId 0x00000000
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [info] [network.cpp:227] onDeviceAnnounce: nodeId 0x32a4 eui64 0x72E98302008D150080
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:240] Fetching device info
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:344] ApplicationVersion 2
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:364] ModelIdentifier lumi.remote.b1acn01
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [debug] [zigbee_capability.cpp:1057] Device 0x72E98302008D1500 ready
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:1060] Device limit reached, finishing discovery
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:492] finishDiscovery. discoveryRequestId=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discoveryRequestId_
5, discovered 1 endpoints
```

Подключение устройств

1) Проверки процесса подключения

```
[1444:2035] [2022-10-04 15:39:38.612] [zigbee] [info] [network.cpp:197] onNetworkOpen: 1
[1444:2035] [2022-10-04 15:39:38.612] [zigbee_capability] [info] [zigbee_capability.cpp:990] onNetworkOpened
[1444:2058] [2022-10-04 15:39:40.272] [zigbee] [debug] [callbacks.cpp:70] ezspChildJoinHandler: index 0 joining 1 childId 0x32a4 childEui64 0x72E98302008D1500 childType 4
[1444:2058] [2022-10-04 15:39:40.776] [zigbee] [debug] [callbacks.cpp:159] ezspTrustCenterJoinHandler: newNodeId 0x32a4 newNodeEui64 0x72E98302008D1500 status 1 policyDecision 0 parentOfNewNodeId 0x0000
[1444:2058] [2022-10-04 15:39:40.990] [zigbee] [debug] [callbacks.cpp:110] ezspPollHandler: childId 0x32a4
[1444:2058] [2022-10-04 15:39:41.055] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4 profile 0x0000 cluster 0x0013 srcEp 0 dstEp 0 opts 0x0100 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [debug] [silabs_ncp.cpp:164] ZDO message: nodeId 0x32a4 clusterId 0x0013 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [info] [network.cpp:227] onDeviceAnnounce: nodeId 0x32a4 eui64 0x72E98302008D1500 capability 0x80
[1444:2025] [2022-10-04 15:39:41.055] [zigbee_capability] [info] [zigbee_capability.cpp:1001] onNodeJoined 0x72E98302008D1500
[1444:2058] [2022-10-04 15:39:41.107] [zigbee_device] [info] [zigbee_device.cpp:240] Fetching device info 692E72656D6F74652E6231
61636E303101002002
[1444:2035] [2022-10-04 15:39:41.107] [zigbee_device] [info] [zigbee_device.cpp:344] ApplicationVersion 2 n=server_to_client], m
anufacturerCode=0x0000, trans
[1444:2025] [2022-10-04 15:39:41.107] [zigbee_device] [info] [zigbee_device.cpp:364] ModelIdentifier lumi.remote.b1acn01
[1444:2025] [2022-10-04 15:39:41.107] [zigbee_device] [info] [zigbee_device.cpp:364] ModelIdentifier lumi.remote.b1acn01
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [debug] [zigbee_capability.cpp:1057] Device 0x72E98302008D1500 ready
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:1060] Device limit reached, finishing discovery
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:492] finishDiscovery. discoveryRequestId=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discoveryRequestId_=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discovered 1 endpoints
```

Подключение устройств

1) Проверки процесса подключения

```
[1444:2035] [2022-10-04 15:39:38.612] [zigbee] [info] [network.cpp:197] onNetworkOpen: 1
[1444:2035] [2022-10-04 15:39:38.612] [zigbee_capability] [info] [zigbee_capability.cpp:990] onNetworkOpened
[1444:2058] [2022-10-04 15:39:40.272] [zigbee] [debug] [callbacks.cpp:70] ezspChildJoinHandler: index 0 joining 1 childId 0x32a4 childEui64 0x72E98302008D1500 childType 4
[1444:2058] [2022-10-04 15:39:40.776] [zigbee] [debug] [callbacks.cpp:159] ezspTrustCenterJoinHandler: newNodeId 0x32a4 newNodeEui64 0x72E98302008D1500 status 1 policyDecision 0 parentOfNewNodeId 0x0000
[1444:2058] [2022-10-04 15:39:40.990] [zigbee] [debug] [callbacks.cpp:110] ezspPollHandler: childId 0x32a4
[1444:2058] [2022-10-04 15:39:41.055] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4 profile 0x0000 cluster 0x0013 srcEp 0 dstEp 0 opts 0x0100 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [debug] [silabs_ncp.cpp:164] ZDO message: nodeId 0x32a4 clusterId 0x0013 data 0x47A43272E98302008D150080
[1444:2035] [2022-10-04 15:39:41.055] [zigbee] [info] [network.cpp:227] onDeviceAnnounce: nodeId 0x32a4 eui64 0x72E98302008D1500 capability 0x80
[1444:2025] [2022-10-04 15:39:41.055] [zigbee_capability] [info] [zigbee_capability.cpp:1001] onNodeJoined 0x72E98302008D1500
[1444:2058] [2022-10-04 15:39:41.103] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4 profile 0x0104 cluster 0x0000 srcEp 1 dstEp 1 opts 0x0100 data 0x18000A050042136C756D692E72656D6F74652E623161636E303101002002
[1444:2035] [2022-10-04 15:39:41.103] [zigbee] [info] [network.cpp:355] onZclMessage: nodeId=0x32a4 endpoint=1, profileId=0x0104, clusterId=0x0000, header=(frameControl=0x18[frameType=global, direction=server_to_client], manufacturerCode=0x0000, transactionSequenceNumber=0x00, commandId=0x0a), payload=0x050042136C756D692E72656D6F74652E623161636E303101002002, payloadSize=27
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:240] Fetching device info
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:344] ApplicationVersion 2
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:364] ModelIdentifier lumi_remote_b1acn01

[debug] [zigbee_capability.cpp:1057] Device 0x72E98302008D1500 ready
[info] [zigbee_capability.cpp:1060] Device limit reached, finishing discovery
```

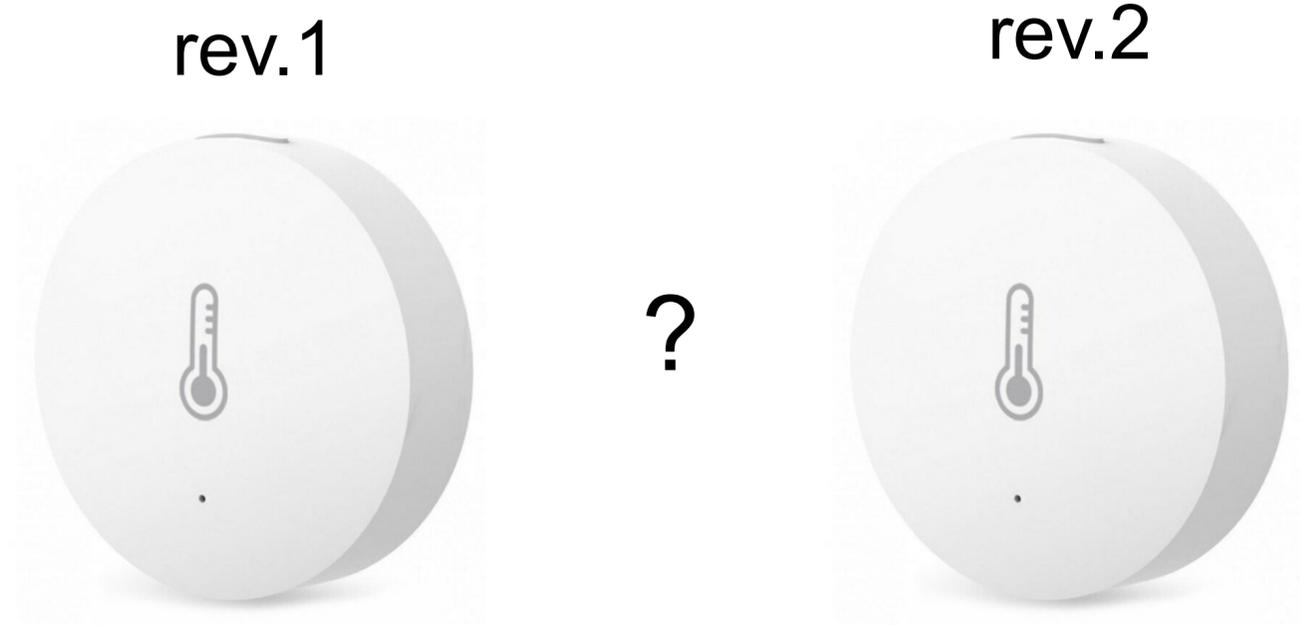
Подключение устройств

1) Проверки процесса подключения

```
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:70] ezspChildJoinHandler: index 0 joining 1
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:159] ezspTrustCenterJoinHandler: newNodeId 0x0000
[1444:2058] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:110] ezspPollHandler: childId 0x32a4
[1444:2058] [2022-10-04 15:39:41.104] [zigbee] [debug] [callbacks.cpp:131] ezspIncomingMessageHandler: node 0x32a4
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [debug] [silabs_ncp.cpp:164] ZDO message: nodeId 0x32a4 clusterId 0x00000000
[1444:2035] [2022-10-04 15:39:41.104] [zigbee] [info] [network.cpp:227] onDeviceAnnounce: nodeId 0x32a4 eui64 0x72E98302008D150080
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:240] Fetching device info
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:344] ApplicationVersion 2
[1444:2025] [2022-10-04 15:39:41.104] [zigbee] [info] [zigbee_device.cpp:364] ModelIdentifier lumi.remote.b1acn01
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [debug] [zigbee_capability.cpp:1057] Device 0x72E98302008D1500 ready
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:1060] Device limit reached, finishing discovery
[1444:2025] [2022-10-04 15:39:41.110] [zigbee_capability] [info] [zigbee_capability.cpp:492] finishDiscovery. discoveryRequestId=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discoveryRequestId_=c4ac5a3c-5b24-4412-9beb-106f45ea3d95, discovered 1 endpoints
```

Подключение устройств

2) Разные ревизии девайсов



```
[info] [zigbee_device.cpp:344] ApplicationVersion 5
[info] [zigbee_device.cpp:349] StackVersion 2
[info] [zigbee_device.cpp:354] HWVersion 30
[info] [zigbee_device.cpp:359] ManufacturerName LUMI
[info] [zigbee_device.cpp:364] ModelIdentifier lumi.weather
```

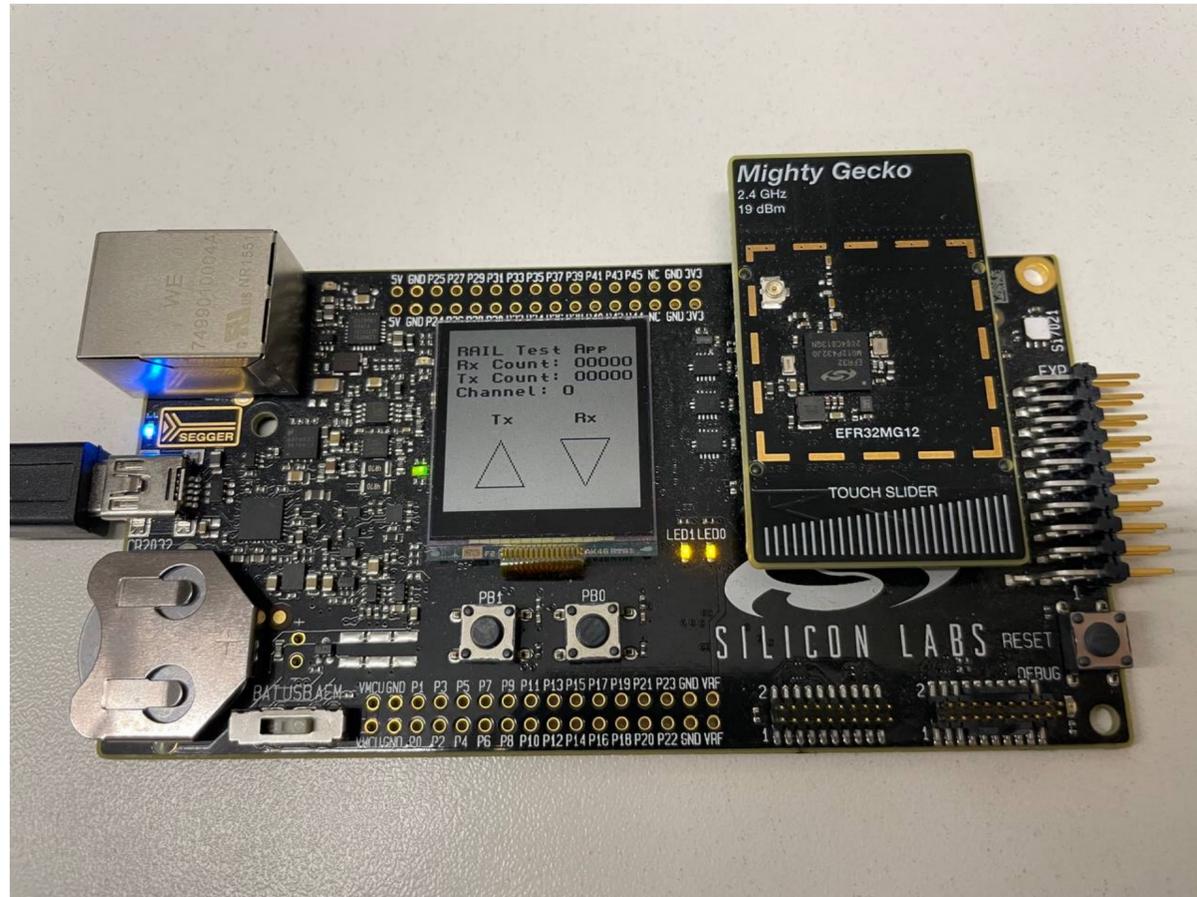
Подключение устройств

3) Количество устройств



Передача данных

1) Стабильность работы - снифферы



No.	Time	Source	Destination	Protocol	Length	Info
2101	192.900682			IEEE 802.15.4	5	Ack
2102	193.194266	0x110d	0x0000	IEEE 802.15.4	12	Data Request
2103	193.195034			IEEE 802.15.4	5	Ack
2104	193.387306	0x570a	0x0000	IEEE 802.15.4	92	Fragment or Frak, Dst: 0x0000, Src: 0x570a, Bad FCS
2105	193.504042	0x0278	0x0000	ZigBee	52	ZCL: Report Attributes, Seq: 0
2106	193.506074			IEEE 802.15.4	5	Ack
2107	193.507626	0x0278	0x0000	IEEE 802.15.4	12	Data Request
2108	193.508394			IEEE 802.15.4	5	Ack
2109	193.509498	0x0278	0x0000	ZigBee	53	ZCL: Report Attributes, Seq: 1
2110	193.511562			IEEE 802.15.4	5	Ack
2111	193.512810	0x0278	0x0000	ZigBee	53	ZCL: Report Attributes, Seq: 2
2112	193.514874			IEEE 802.15.4	5	Ack
2113	193.516426	0x0278	0x0000	ZigBee	53	ZCL: Report Attributes, Seq: 3
2114	193.518506			IEEE 802.15.4	5	Ack
2115	193.700906			IEEE 802.15.4	5	Ack
2116	193.797562	0xebc6	Broadcast	ZigBee	47	Command, Dst: Broadcast, Src: 0xebc6
2117	193.901114	0xdcdc	0x0000	IEEE 802.15.4	12	Data Request
2118	193.901882			IEEE 802.15.4	5	Ack
2119	194.192922	0x110d	0x0000	IEEE 802.15.4	12	Data Request
2120	194.193690			IEEE 802.15.4	5	Ack
2121	194.374522	0x0000	Broadcast	ZigBee	47	Link Status
2122	194.457738	0x0000	Broadcast	ZigBee	47	Command, Dst: Broadcast, Src: 0x0000
2123	194.521178	0x0278	0x0000	IEEE 802.15.4	12	Data Request
2124	194.521946			IEEE 802.15.4	5	Ack
2125	194.756826			IEEE 802.15.4	5	Ack
2126	194.886042	0x0000	Broadcast	IEEE 802.15.4	47	Data, Dst: Broadcast, Src: 0x0000, Bad FCS
2127	194.902314	0xdcdc	0x0000	IEEE 802.15.4	12	Data Request
2128	194.903082			IEEE 802.15.4	5	Ack
2129	194.954410	0x0000	Broadcast	IEEE 802.15.4	47	Data, Dst: Broadcast, Src: 0x0000, Bad FCS
2130	195.142538			IEEE 802.15.4	10	Beacon Request
2131	195.146028	0x1b85	Broadcast	IEEE 802.15.4	28	Beacon, Src: 0x1b85, FCS: 02:d2:36:aa:a7:a7:78:25

Frame 2111: 53 bytes on wire (424 bits), 53 bytes captured (424 bits) on interface /tmp/wiresharkRx_ttyUSB0, id 0

- IEEE 802.15.4 Data, Dst: 0x0000, Src: 0x0278
- ZigBee Network Layer Data, Dst: 0x0000, Src: 0x0278
- ZigBee Application Support Layer Data, Dst Endpt: 1, Src Endpt: 1
- ZigBee Cluster Library Frame, Command: Report Attributes, Seq: 2
 - Frame Control Field: Profile-wide (0x18)
 - Sequence Number: 2
 - Command: Report Attributes (0x0a)
 - Attribute Field
 - Attribute: Measured Value (0x0000)
 - Data Type: 16-Bit Unsigned Integer (0x21)
 - Measured Value: 43.35 [%]

```
0000 61 88 76 7a de 00 00 78 02 48 22 00 00 78 02 1e  a.vz...x.H"...x...
0010 1e 28 17 0a 00 00 93 57 1e 00 10 44 ef 54 00 88  {...W...D.T...
0020 f7 ec 81 8b 9b fa 56 88 78 59 68 18 52 7c ba 35  ....V.xYhR|.5
```

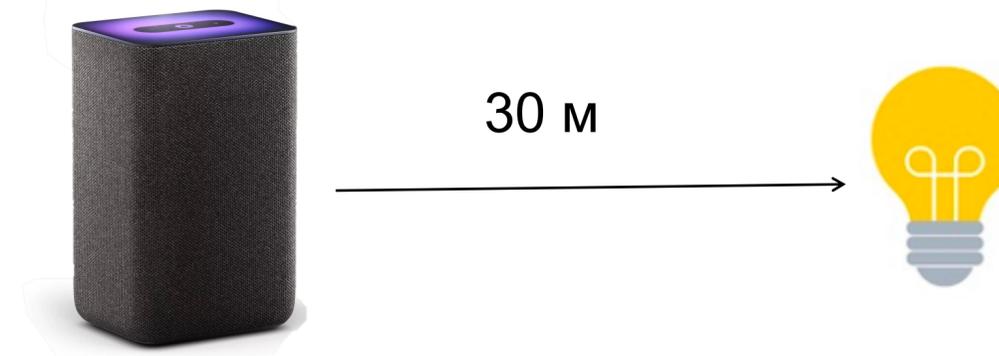
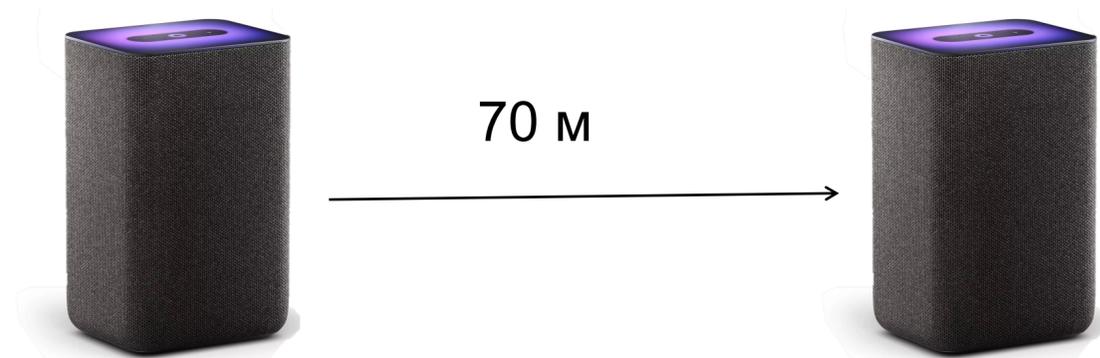
Frame (53 bytes) | Decrypted ZigBee Payload (16 bytes)

Ready to load or capture

Packets: 3565 - Displayed: 3565 (100.0%) Profile: Default

Передача данных

2) Дальность покрытия



Передача данных

3) Стабильность работы модуля

```
#!/bin/bash

did=''

if [ -n "$1" ]
then
    did="$1"
else
    exit 1
fi

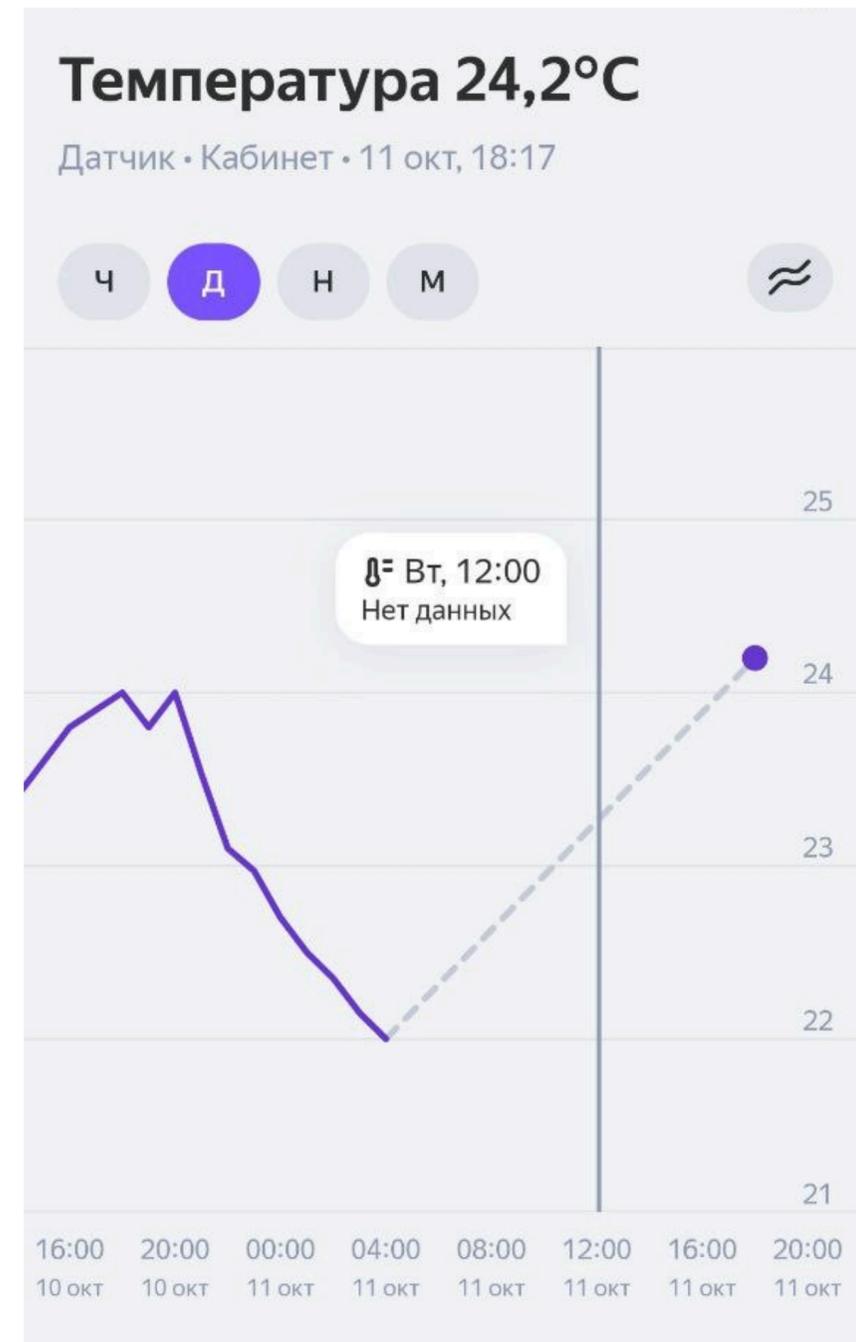
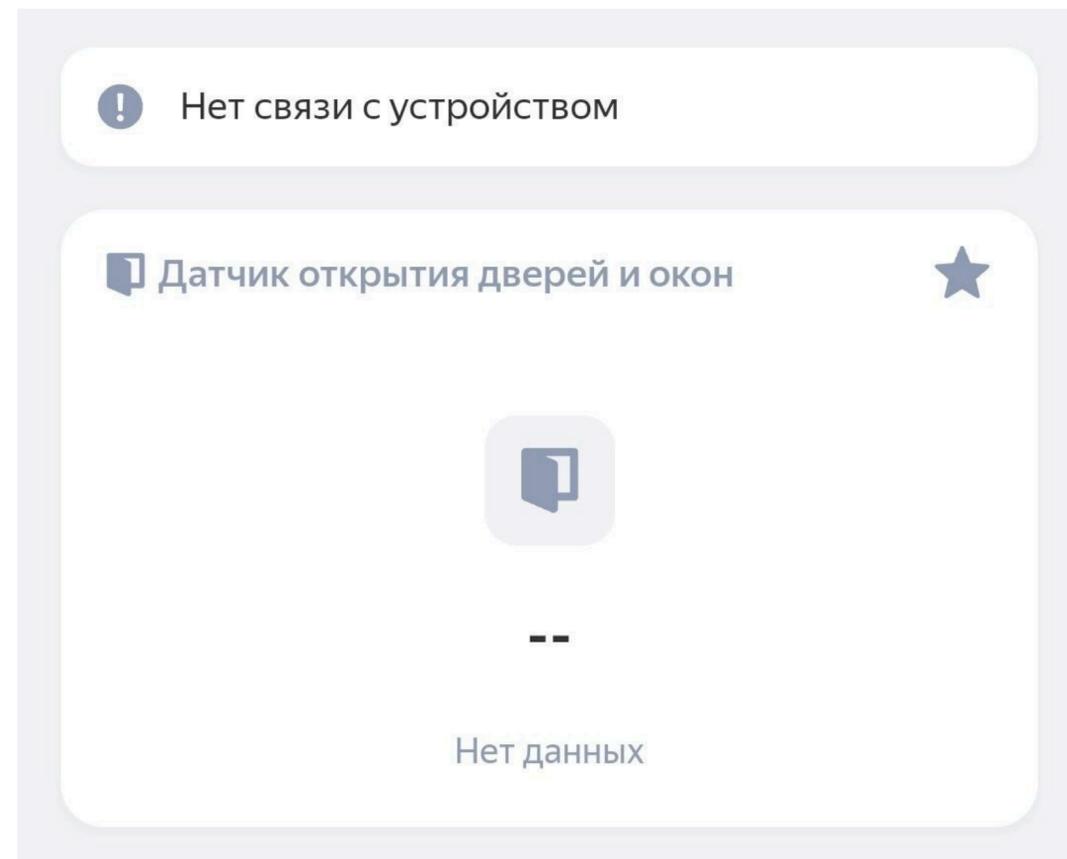
i=0

while True
do
    i=$(( i+1 ))
    echo "try №$i"
    adb -s $did shell q stop && adb -s $did shell q start && sleep 1 && adb -s $did shell amixer set Master 4
    echo "restart success"
    echo "start sleep"
    sleep 15
    echo "stop sleep"
    echo $did
    zero=$(adb -s $did shell cat /data/quasar/daemons_logs/* | grep -i GstIirEqualizerBand)
    if [ $? -eq 0 ]
```

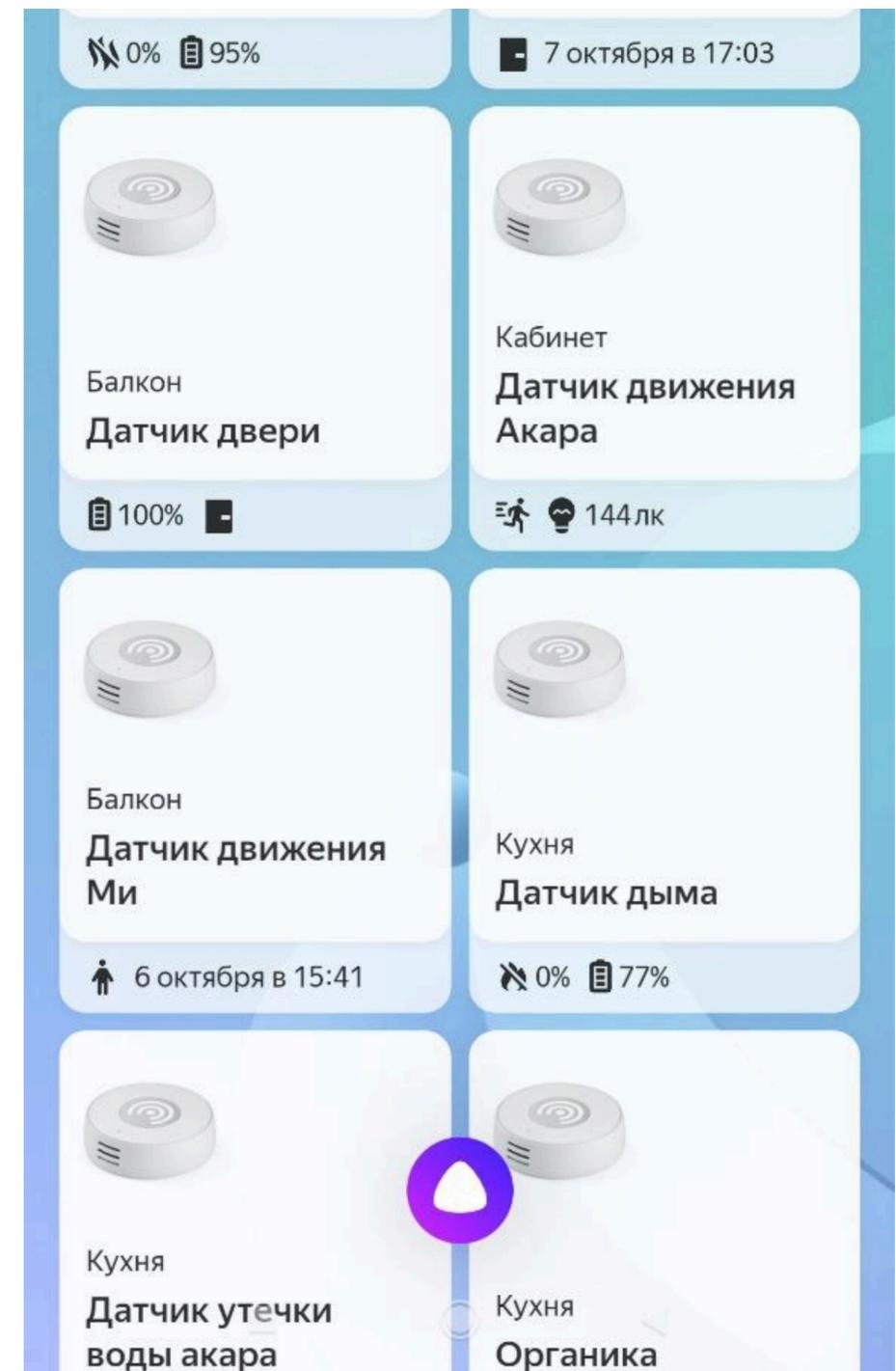
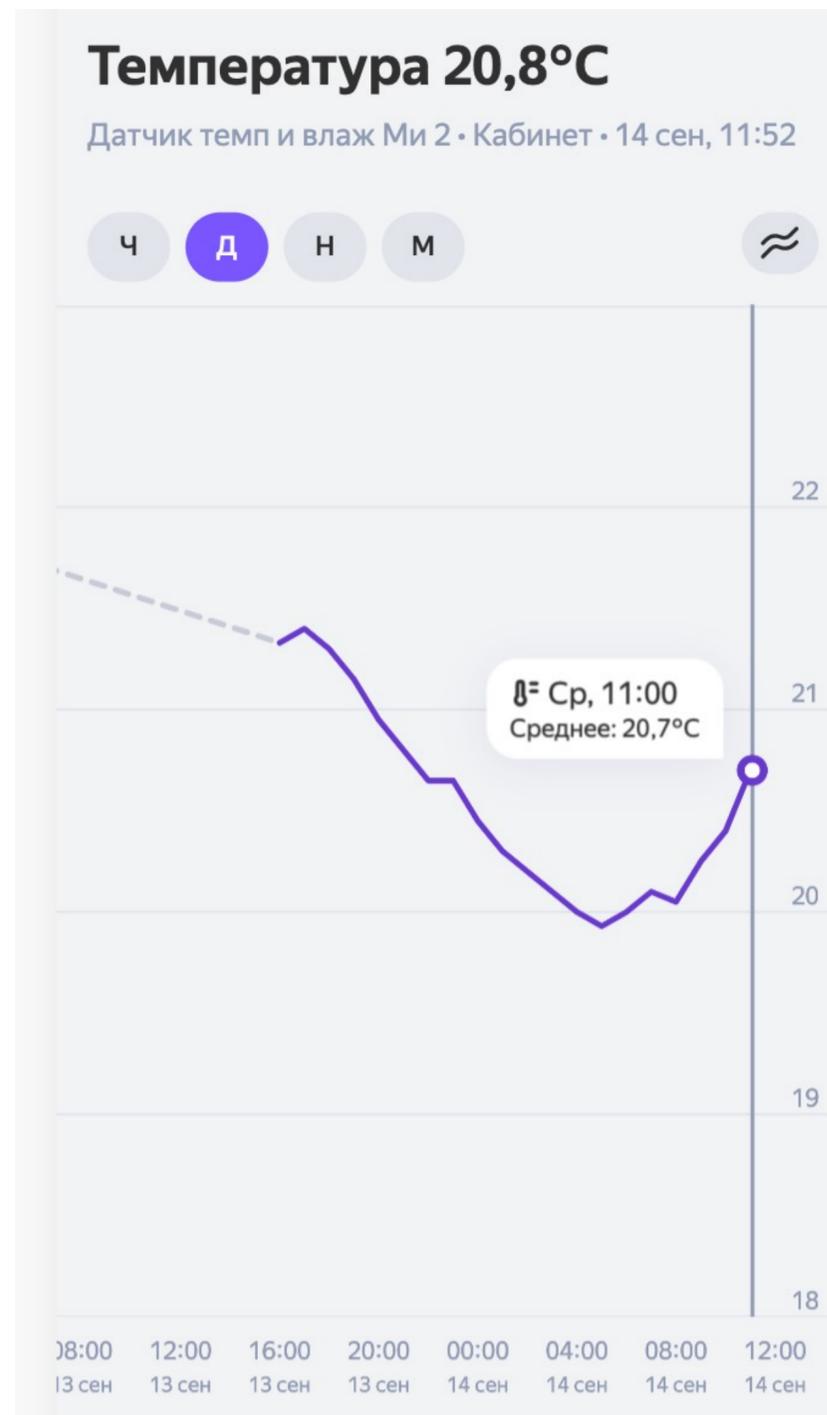
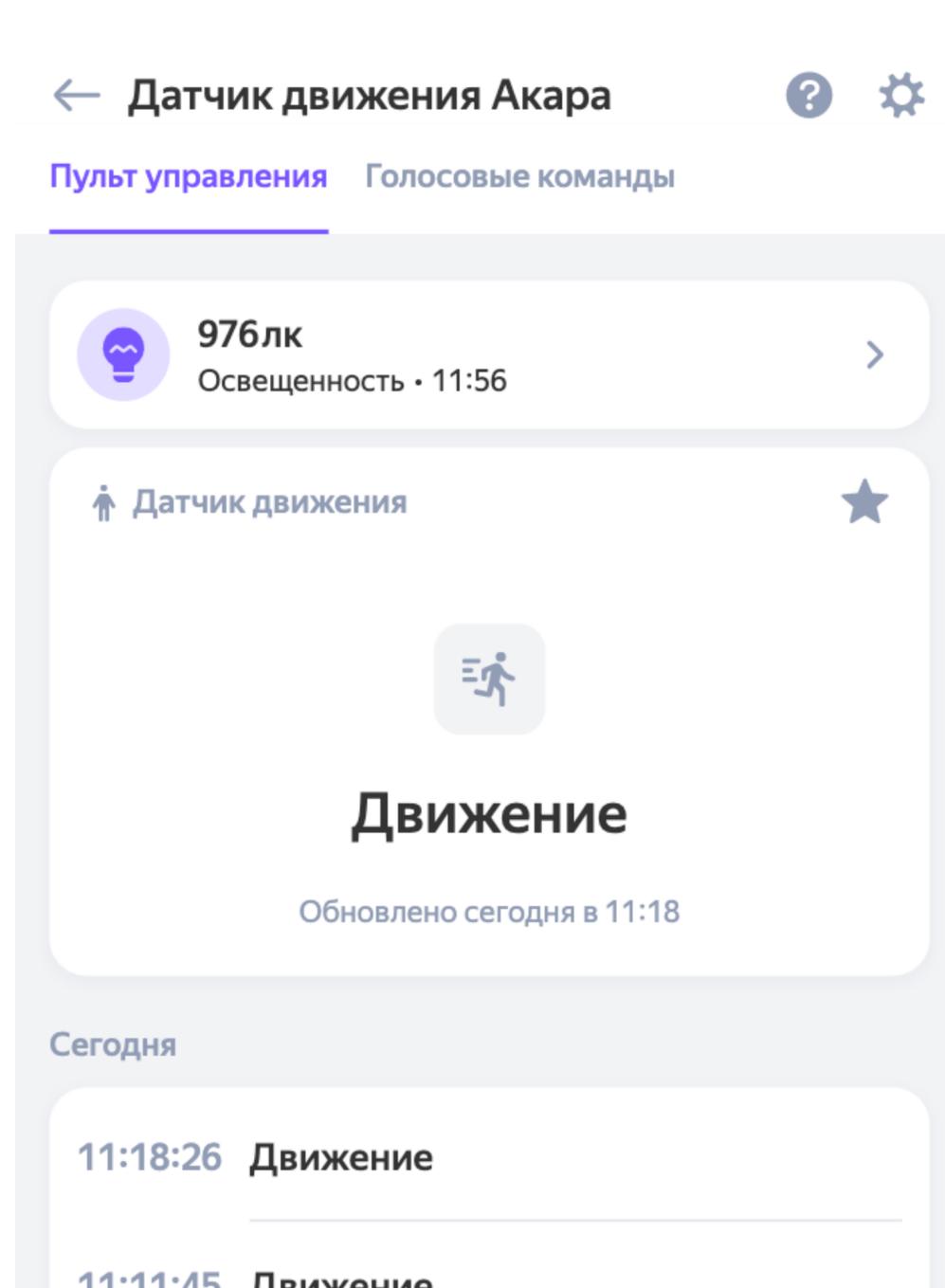
```
then
    mkdir $did
    adb -s $did pull $daemons_logs ./$did
    echo "logs received"
    exit 0
else
    echo "no minidump"
fi
done
```

Передача данных в нештатных условиях

- 4) Ребуты устройств – не теряем показания
- 5) Переподключение сети



Поддержали в приложении



Голосовые сценарии

- Добавление голосом – не должны мешать старым сценариям
- Опрос показаний голосом



Проверка статуса

Что с датчиком?

Какая температура на датчике?

Какая температура в доме?

Какая влажность на датчике?

Какая влажность в доме?

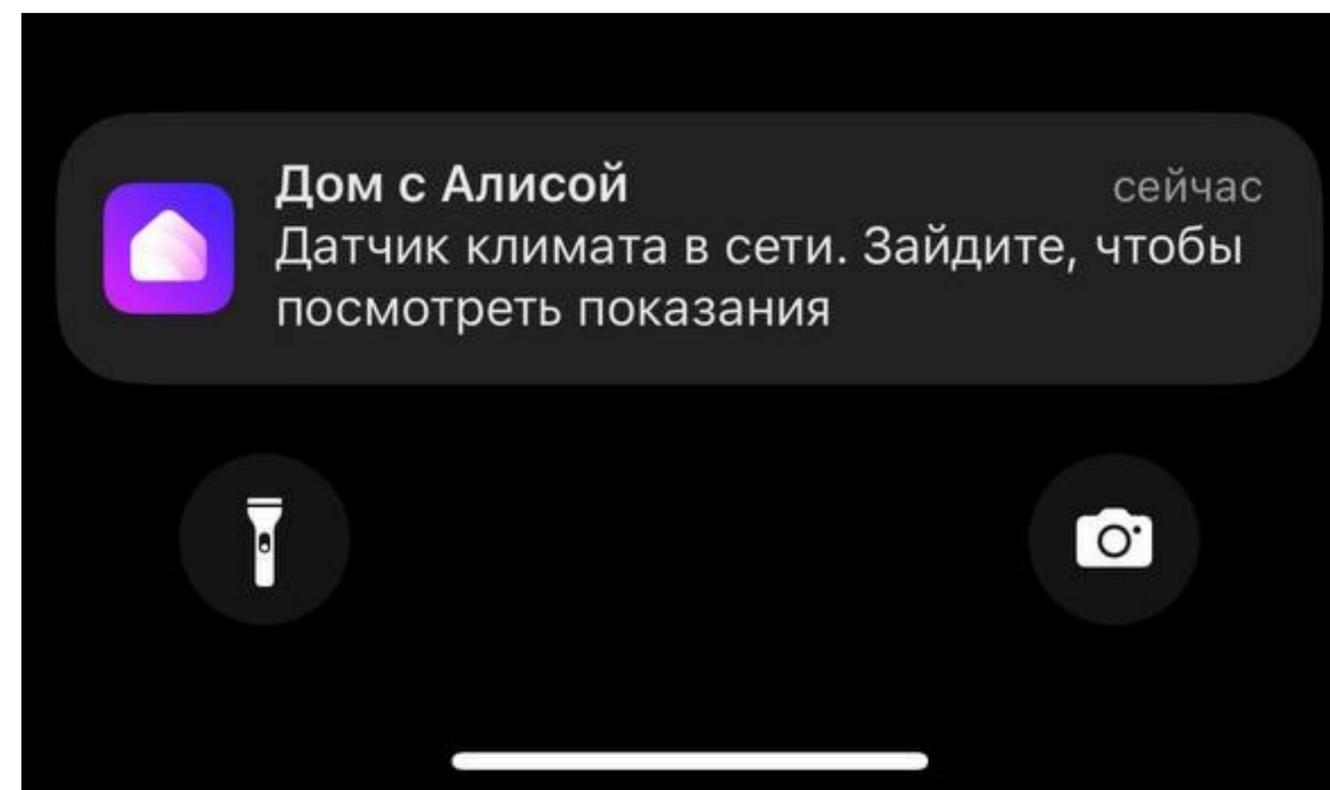
Какое давление на датчике?

Какое давление в доме?

Свернуть ^

Голосовые сценарии

- Возврат данных (range check)



Выходим в реальность

- Бета: сбор фидбека
- У людей свои девайсы, окружения

#report так и не заработало два датчика дома. Переподключить?

#report У меня на даче отвалились все датчики

#report не работает датчик f [REDACTED] d0

Комьюнити

<https://wiki.yaboard.com/>

Нет, серьезно, прочитайте внимательно



На странице представлен список устройств для [Яндекс Станции 2](#) из различных интернет-магазинов. Список полностью основан на личном опыте пользователей и **не является официальной рекомендацией Яндекса.**

Здесь собраны устройства, проверенные участниками сообщества Умного дома Яндекса. **Каждый из нас может внести свою лепту!** Если у вас есть устройство, которого нет в этом списке, пожалуйста, сообщите редактору [@ant0lk](#) (Антон Толкачев) или модераторам Вики ([@arkrusinov](#)). Мы будем очень благодарны!

Tuya

Умная розетка с энергомониторингом



Модель: TS011F_plug_3

Подключается

Есть особенности

Протокол Zigbee

Управление вкл/выкл

Особенности Многие розетки могут определяться под такой внутренней моделью. Работоспособность каждой не гарантируется.

UseLink

Умный удлинитель с 4 розетками и 2 USB портами



Модель: SM-SO306E-2W

Не подключается

Протокол Zigbee



<https://t.me/yadialogschat>



https://t.me/station_yandex

Мораль

- декомпозируйте свои задачи
- нужно как можно больше референсных устройств
- при тестировании беспроводной передачи данных нужно учитывать окружение
- тесты на реальных устройствах оказываются сложнее, чем вы ожидали
- вам могут помочь тесты на «живых людях»

Яндекс

HEISENBUG

Спасибо! 

Башев Дмитрий

Инженер по тестированию

bashev-da@yandex-team.ru

Осенникова Клавдия

Инженер по тестированию

osennikovak@yandex-team.ru