



HOLOGRAM

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PI AND MORE 10 1/2



WHO AM I?

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OVERVIEW

- Introduction
- Hologram
- Example project



INTRODUCTION

IoT Devices - how to connect to the net?



OPTIONS

- Ethernet
- WiFi
- GSM/UMTS
- LoRa
- Sigfox



PROBLEMS?

- Ethernet: (mostly) not available
- WiFi: (mostly) not available & high energy consumption
- LoRa, Sigfox: slow & not very widely available



ADDITIONAL PROBLEMS?

- Sigfox: Uplink only 3 times a day
- LoRa, Sigfox: Security?
- Ethernet & WiFi: What about handling the data easily?



WHAT ABOUT GSM/UMTS?

- Very widely available in the world
- High bandwidth (compared to LoRa / Sigfox)



DOWNSIDERS?

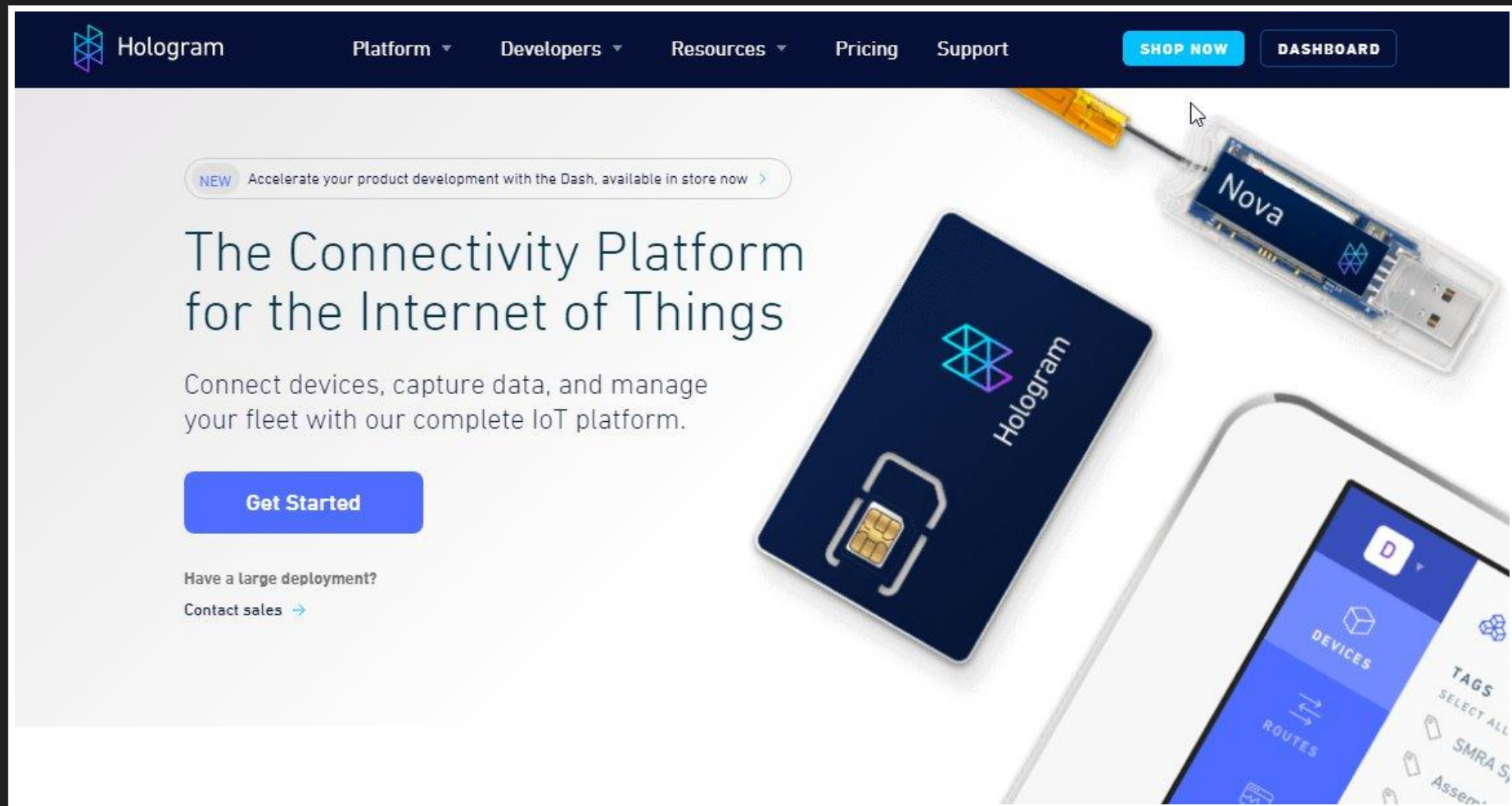
- High energy consumption
- Too many network providers (global scale)
- Sometimes roaming restrictions
- Data handling: same problem as Ethernet & WiFi
- Security



ENTER HOLOGRAM

- DOES NOT solve energy issue - sorry :(!
- DOES solve the provider issue
- DOES solve the data handling / routing issue
- DOES solve the security issue

HOLOGRAM



The screenshot shows the Hologram website homepage. At the top is a dark blue navigation bar with the Hologram logo on the left and links for Platform, Developers, Resources, Pricing, and Support in the center. On the right of the bar are two buttons: 'SHOP NOW' in blue and 'DASHBOARD' in white. Below the navigation bar, there is a light gray banner. On the left side of the banner, the text 'The Connectivity Platform for the Internet of Things' is displayed in a large, dark font. Below this, a smaller line of text says 'Connect devices, capture data, and manage your fleet with our complete IoT platform.' A blue button labeled 'Get Started' is positioned below the text. To the right of the text, there is a small blue box with the word 'NEW' and a link to 'Accelerate your product development with the Dash, available in store now'. On the right side of the banner, there is a photograph of a blue Hologram SIM card, a small blue circuit board labeled 'Nova' connected to a yellow cable, and a smartphone displaying the Hologram mobile application interface with options like 'DEVICES', 'ROUTES', and 'TAGS'.

WHAT IS HOLOGRAM?



- NOT a worldwide acting provider, BUT a "resaler"





RESALER?

- 550+ carriers
- 180+ countries
- 2G/3G/4G/LTE/CAT-M

PRICING OPTIONS



- Pay as you go / Prepaid plans

	● ZONE 1	● ZONE 2 (INCLUDES ZONE 1 COVERAGE)
Platform Fee	\$0.40	\$0.40
Cost (billed per kb)	\$0.60 / MB	\$0.85 / MB

- SMS

	● ZONE 1	● ZONE 2 (INCLUDES ZONE 1 COVERAGE)
Inbound SMS (sent to device)	FREE	FREE
Outbound SMS (sent from device)	\$0.19 / Message	\$0.30 / Message

PRICING OPTIONS



- Monthly plans
- High bandwidth plans [US-only]
- Free Developer Tier

A pricing card for the 'Developer' tier. It features a blue diagonal banner in the top-left corner with the word 'FREE' in white. The title 'Developer' is centered at the top. Below it, the price '\$0' is displayed in a large, bold font. Underneath the price, the text '1MB / MONTH INCLUDED' is shown, followed by 'ADD'L DATA \$0.60 / MB (BILLED BY KB)' in a smaller font. A large blue button with the text 'Try it FREE' is centered at the bottom of the card. Below the button, a small note reads '*Just cover shipping'.

Developer

\$0

1MB / MONTH INCLUDED
ADD'L DATA \$0.60 / MB (BILLED BY KB)

Try it FREE

*Just cover shipping



WHAT IS HOLOGRAM?

- Data aggregator / router
- Similar to a Message Queue

ROUTING WITH TOPICS



Create new route

[Learn about creating routes](#)

ROUTE NICKNAME

STATUS

ON ☒

IN

Select topics

Search by topic name

SELECT TOPICS FROM RECENT MESSAGES

PAM

JSONSTRING

> ↑ Unnamed Devi...

SOCKETAPI



MODIFY INCOMING DATA

The screenshot shows a data processing workflow interface. On the left, a vertical timeline has a purple circle labeled 'OP' in the center. Above and below this circle are grey circular buttons with a '+' icon and the text 'Insert operation (optional)'. The main area is a light grey rectangle containing a white dialog box titled 'Select an operation' with a close button (X) in the top right corner. Inside the dialog box, there are two selectable options:

- Modifier (BETA)**: Represented by a purple icon of three interconnected nodes. The description below it reads: 'Use variables to translate your messages into a different format.'
- Heartbeat (BETA)**: Represented by a purple heart icon with a pulse line. The description below it reads: 'Monitor for devices to go down.'

OUTPUT: IFTTT, S3, SLACK,...



OUT

Select an action

 Losant Device Send State (BETA) Send data directly to a Losant device	 Amazon S3 (BETA) Route your messages as flat files into your own Amazon S3 instance
 IFTTT Maker Webhook IFTTT is a free web-based service that people use to create chains of simple conditional statements, called applets.	 Losant Webhook Losant Webhook Integration
 Advanced Webhook Builder (Your Own App) HTTP POSTs device data to a URL of your choosing!	 Slack Slack brings all your communication together in one place. It's real-time messaging, archiving and search for modern teams.
 SMS Send an SMS to any phone number and optionally add device data.	 AT&T m2x (beta) Publish data to AT&T's m2x platform
 Email Send an email to any recipient and optionally add device data.	 Custom Webhook URL (Your Own App) HTTP POSTs device data JSON objects to a URL of your choosing!



WHAT IS HOLOGRAM?

- Security provider
- Uses the SIM Card as HW Security Device

WHAT YOU CAN DO WITH THAT?



1. Establish Trust

Initial key storage at time of secure SIM manufacturing establishes trust without loading and coordinating certificates



2. Embed Physical Hardware Security in IoT Devices

Hologram secure IoT SIMs provide a hardware-based 'something you must have' security element for multi-factor authentication (MFA)



3. Build developer tools to enable unique one-time-passwords for machines (OTP-M)

Enable MFA in only a few lines of code with Hologram developer tools



4. Develop nonce and challenge-response scheme

All Hologram secure IoT SIMs have an encoded nonce and challenge response scheme to generate OTP-Ms



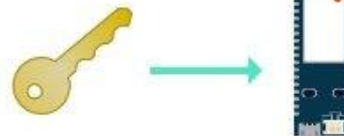
5. Validate Device Authentication/Identity

Hologram validates OTP-Ms for message authentication and device identification



6. Automatic continuous key rotation

Hologram secure IoT SIMs rotate new keys to prevent forward and backward secrecy vulnerabilities



7. Reestablish Trust Remotely

When an incident occurs, Hologram remotely updates new keys for authentication



INTEGRATION?

- (Using CLI and Nova Hardware)



```
{ "cause": "ping", "mv": 4192, "pct": 99, "fc": 0 }
```

 **Message sent from Tracker Device (12345)**

1. Build your Product

2. Send a message with Hologram MFA

Learn more about Hologram IoT SIMs [→](#)



OTHER SECURITY MEASURES?

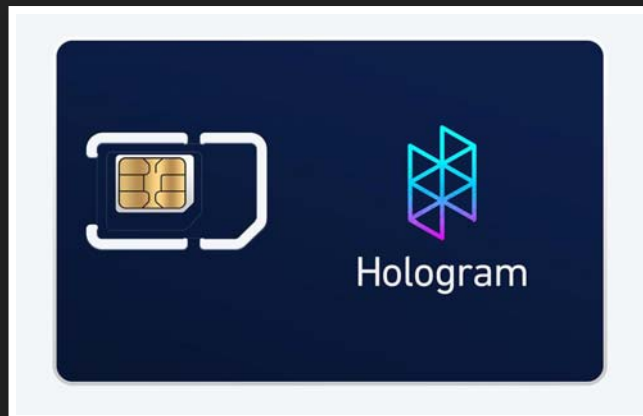
- Secure Tunnels with Spacebridge
- Uploading own SSH Keys
- Authentication using Device API
- ...



BONUS: EASE OF USE

- Hardware
- Software
- Services
- Tutorials

NOVA & DASH





SOFTWARE?

- CLI (use with i.e. Nova)
- Python SDK
- pppd with nc works too ;)



SERVICES?

- REST API
- TCP "API"
- Routing
- Spacebridge
- MFA



EXAMPLE PROJECT



(for a Hackster contest)

HARDWARE





WHAT DOES IT DO?

- Uses promiscuous mode with WiFi of RPi Zero W
- Scans for WiFi Clients in the area with certain MAC
- Sends warning to Hologram if found
- Hologram routes warning to IFTTT
- IFTTT sends a Tweet
- Alarm on Twitter
- Yes, can be solved easily++, but fun-- :'(



CODE?

```
if 'f8:8f:ca:24' in p.addr2:  
    print "WARNING! GOOGLE GLASS DETECTED!"  
    os.system("sudo hologram send -t twitter dangerousDeviceN
```

ROUTE?



Configure route [Learn about creating routes](#)

ROUTE NICKNAME: STATUS: ON

IN: twitter edit

+ Insert operation (optional)

OUT:

IFTTT Maker Webhook

Configure action

WEBHOOK KEY
Key Portion of the IFTTT Webhook URL

EVENT
Event portion of the IFTTT Webhook URL

Data to send to IFTTT. Supports our advanced webhook variables. Leave as <<data>> to passthrough all data

Update route Cancel Delete



TWITTER?





SOURCE CODE

<https://github.com/nmaas87/GlassAware>



CONCLUSION

- For non-battery constrained projects interesting
- Cool take on security (SIM Card)
- ... but not yet proven!
- For projects with high data volume too expensive
- For "switch" projects very cool (SMS receive = free!)
- Use with an old GPRS/UMTS modem & pppd :)



QUESTIONS?

Thank you for your attention :)

www.nico-maas.de