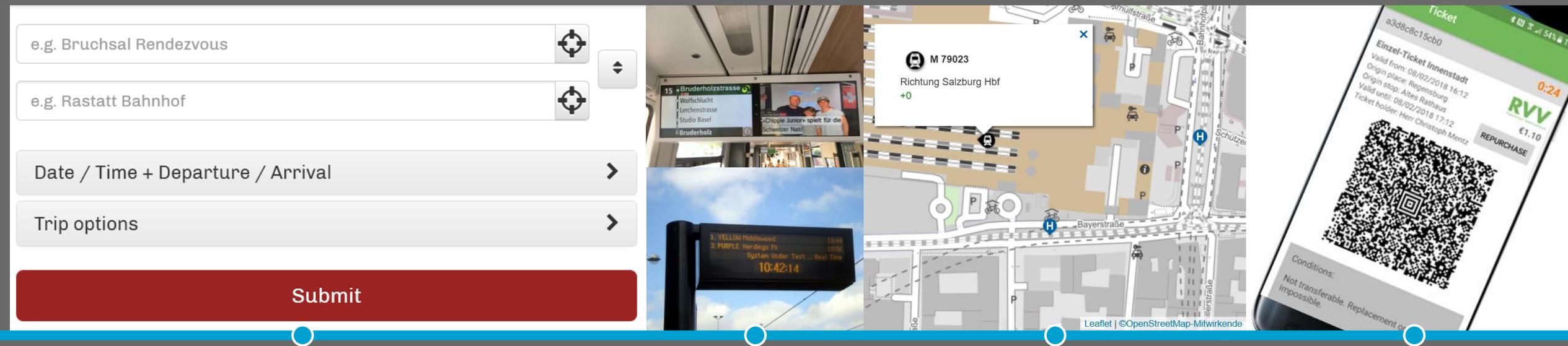


Progress in indoor navigation

step-by-step navigation in public transport stations



Wherecamp 2018

MENTZ

Inhalt

Progress in indoor navigation

1. step-by-step navigation in apps based on OpenStreetMap
2. Beacons
 - why beacons
 - specifications
 - configuration and installation
3. realtime positioning based on beacons



www.vrr.de



15:36 +0 - 16:56 1 h 20 Min.

RE42 U17

15:36 +0 Münster (Westf) Hbf, Münster (Westf) plat. 14

R-Bahn RE42 towards Essen Hauptbahnhof

Additional information available!

13 stops, 1 h 9 Min.

16:45 +0 Hauptbahnhof, Essen plat. 2

Footwalk: 195 m, 7 Min. Waiting: 1 Min.

step-by-step navigation in apps based on OpenStreetMap

- Currently the app **Verkehrsverbund Rhein-Ruhr (VRR)** is using GPS signal to get a position and locate the user.
- The goal with this project is to extend the app with a bluetooth guidance system.
- This allows to navigate the user on footways within public transport travel chains and offers them orientation, regardless of whether they are outside or inside station buildings, or in the underground.

15:36 +0 - 16:56 1 h 20 Min.

RE42 U17

15:36 +0 Münster (Westf) Hbf, Münster (Westf) plat. 14

R-Bahn RE42 towards Essen Hauptbahnhof

Additional information available!

13 stops, 1 h 9 Min.

16:45 +0 Hauptbahnhof, Essen plat. 2

Footwalk: 195 m, 7 Min. Waiting: 1 Min.

- after 0 m turn slight right to walk inside building
- after 24 m turn slight left to escalator downward to level 0
- after 11 m turn slight left to walk inside building
- after 4 m turn slight left to street crossing with traffic lights
- after 99 m turn right to Freiheit
- after 54 m turn slight left to Huysenallee

16:53 +0 Hauptbahnhof, Essen Bay 3

U-Bahn U17 towards Essen Karlsplatz

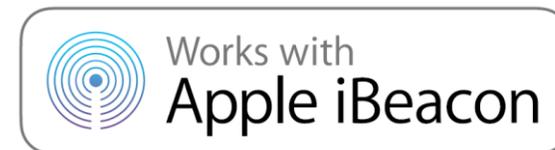
2 stops, 3 Min.

Beacons

Why are we using beacons?

Features

- Standards: iBeacon , Eddystone
- Dimensions 84 x 84 x 24 mm
- Bluetooth Low Energy®
- Distance Range Up to 100m
- Parameters are configurable
- Waterproof, operating temperature -20 to +54°C
- battery lifetime ~ 60 – 100 months

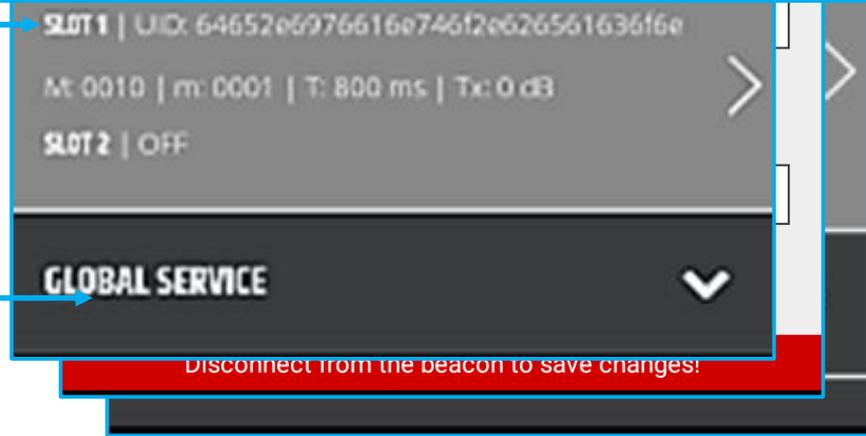


Beacons

configuration & installation



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	fgfg	level	ref:pt_id	beacon:major / Decim	major	minor	beacon:minor (dez)	beacon:uuid	Tx	dbm	conr	co	conf	OSM (y/n)	indoormark	beacon:type	beacon a
56	Renault Zentrum Rhein-Ruhr-Zentrum		de:05117:15153:70	35	23	3	3	64652e69-7661-6e74-6f2e-626561636f6e						y	beacon	bluetooth	
57	Essen																
58	U Karlsplatz Bahnsteig	-2	de:05113:9370:1	9	9	1	1	64652e69-7661-6e74-6f2e-626561636f6e	0	-58				y	beacon	bluetooth	
59	U Karlsplatz Bahnsteig	-2	de:05113:9370:1	9	9	2	2	64652e69-7661-6e74-6f2e-626561636f6e						y	beacon	bluetooth	
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63	U Karlsplatz Bahnsteig	-2	de:05113:9370:1	9	9	6	6	64652e69-7661-6e74-6f2e-626561636f6e						y	beacon	bluetooth	
64	U Karlsplatz Zwischengeschoß	-1	de:05113:9370:5	9	9	7	7	64652e69-7661-6e74-6f2e-626561636f6e						y	beacon	bluetooth	
65	U Altenessen Mitte Bahnsteig	-2	de:05113:9831:1	10	0a	1	1	64652e69-7661-6e74-6f2e-626561636f6e	0	-58				y	beacon	bluetooth	
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67	U Altenessen Mitte Bahnsteig	-2	de:05113:9831:1	10	0a	3	3	64652e69-7661-6e74-6f2e-626561636f6e	0	-58				y	beacon	bluetooth	
68	U Altenessen Mitte Bahnsteig	-2	de:05113:9831:1	10	0a	4	4	64652e69-7661-6e74-6f2e-626561636f6e	0	-58				y	beacon	bluetooth	
69	U Altenessen Mitte Bahnsteig	-2	de:05113:9831:1	10	0a	5	5	64652e69-7661-6e74-6f2e-626561636f6e						y	beacon	bluetooth	
70	U Altenessen Mitte Bahnsteig	-2	de:05113:9831:1	10	0a	6	6	64652e69-7661-6e74-6f2e-626561636f6e						y	beacon	bluetooth	
71	U Altenessen Mitte Zwischenge	-1	de:05113:9831:4	10	0a	7	7	64652e69-7661-6e74-6f2e-626561636f6e						y	beacon	bluetooth	



Beacons

configuration & installation

- Underground stations equipped with beacons:

Essen

U Karlsplatz
U Altenessen Mitte
U Kaiser-Wilhelm-Park
U Altenessen Bf
U Bäuminghausstraße
U Bamlerstraße
U Universität Essen
U Berliner Platz
U Hirschlandplatz
U Essen Hauptbahnhof
U Bismarckplatz
U Planckstraße
U Philharmonie
U Rüttenscheider Stern
U Martinstraße
U Messe Ost/Gruga
U Messe West/Süd/Gruga
U Florastraße
U Wickenburgstraße
U Rheinischer Platz
U Viehofer Platz
U Rathaus Essen

Mülheim

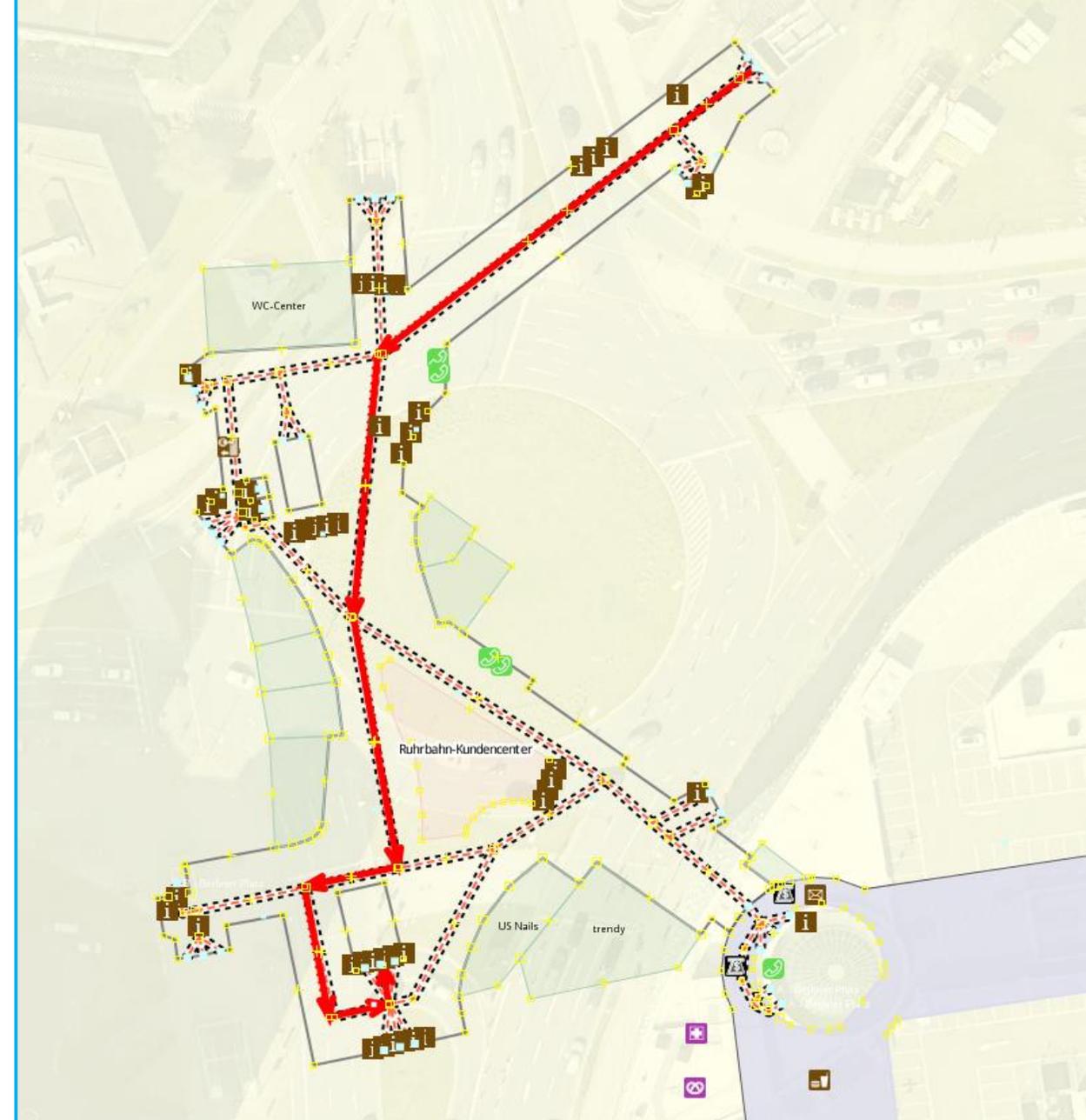
U Eichbaum
U Heißen Kirche
U Mühlenfeld
U Christianstraße
U Gracht
U Von-Bock-Straße
U Mülheim Hbf
U Aktienstraße
U Schloss Broich
U Stadtmitte

...

Beacons

configuration & installation

- The aim is to provide an area-wide signal in underground
- footpaths from the underground entrance to the underground platform can be over a hundred meters

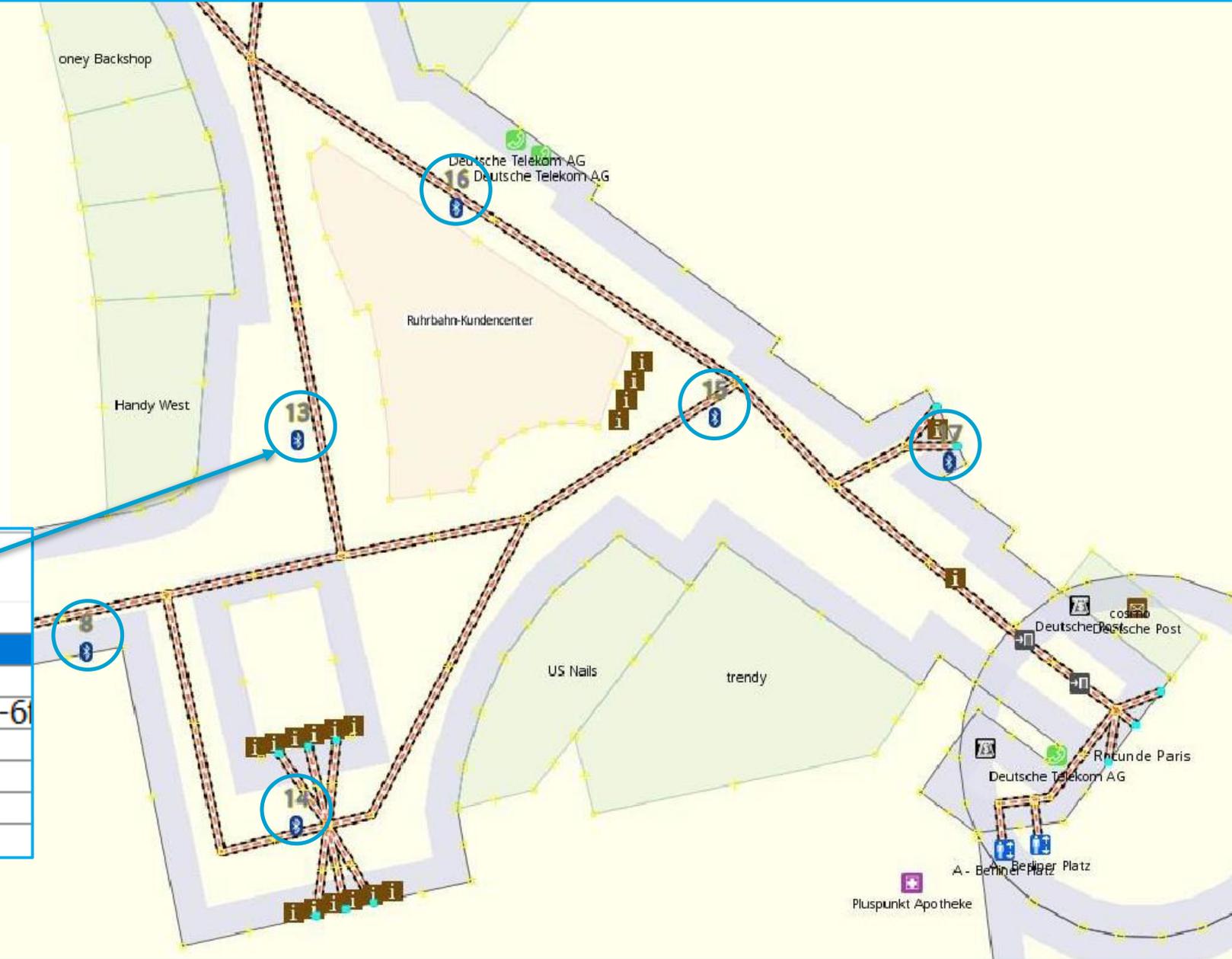


Beacons

configuration & installation

- When attaching the beacons, the structural conditions and signal strength are taken into account

Key	Value
beacon:major	4
beacon:minor	13
beacon:type	bluetooth
beacon:uuid	64652e69-7661-6e74-6
indoormark	beacon
level	-1
ref:pt_id	de:05113:9153:6



Version 2 created on 22/03/18 15:52
 User: EJ
 Changeset: 57425723
 Beacons eingepflegt
 Source: knowledge

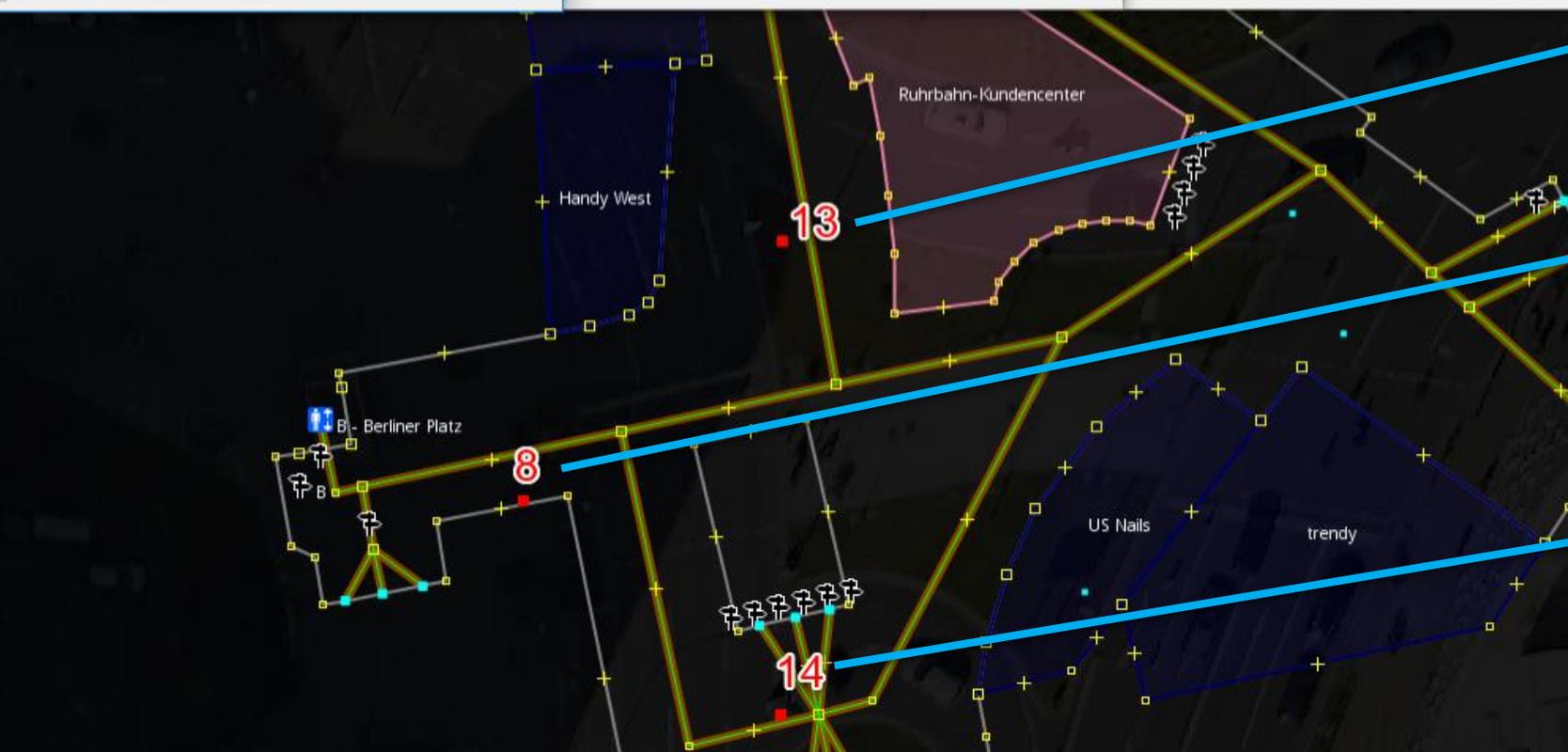
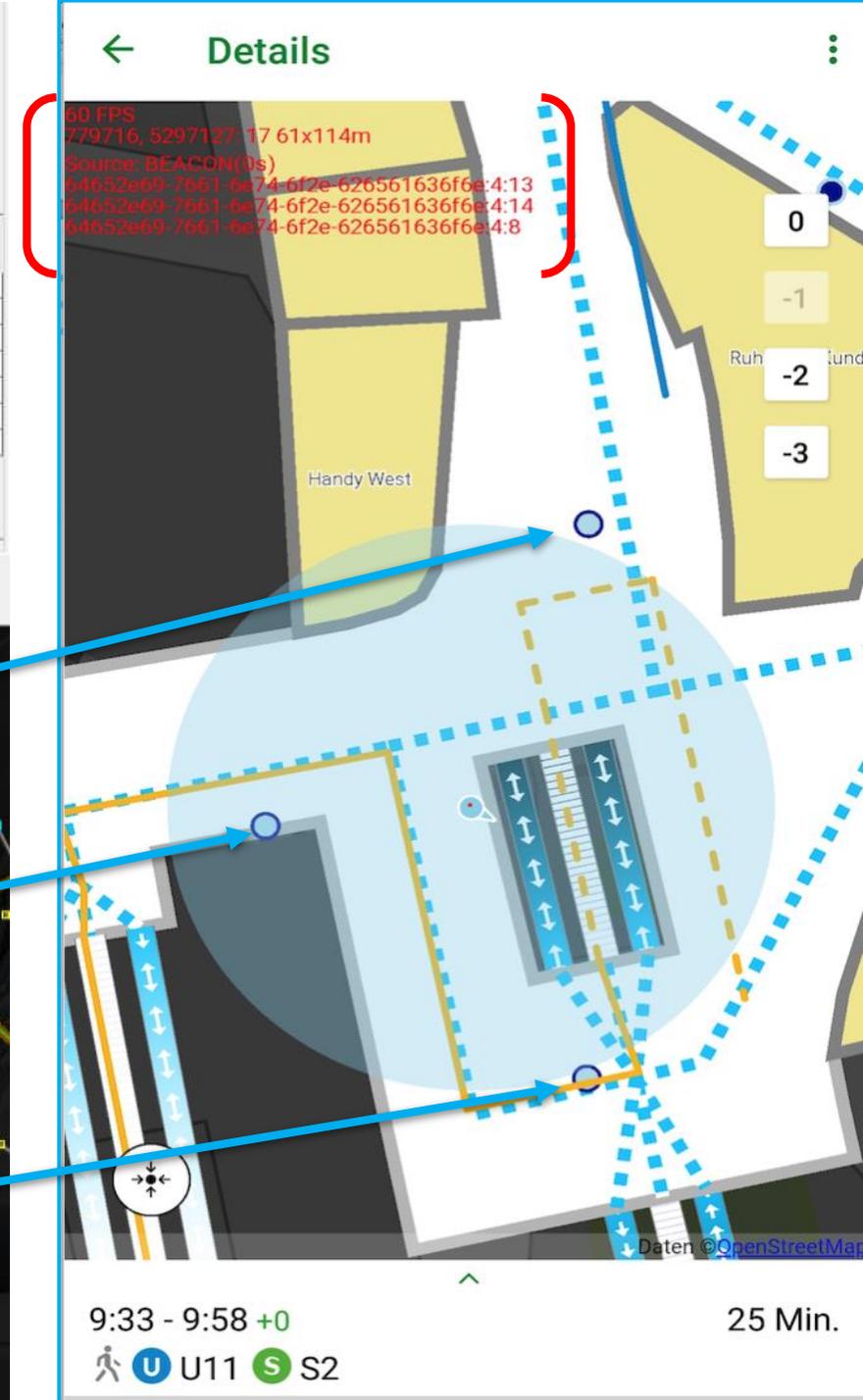
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beacon:minor	8
beacon:type	bluetooth
beacon:uuid	64652e69-7661-6e74-...
indoormark	beacon
level	-1
ref:pt_id	de:05113:9153:6

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 Beacons eingepflegt
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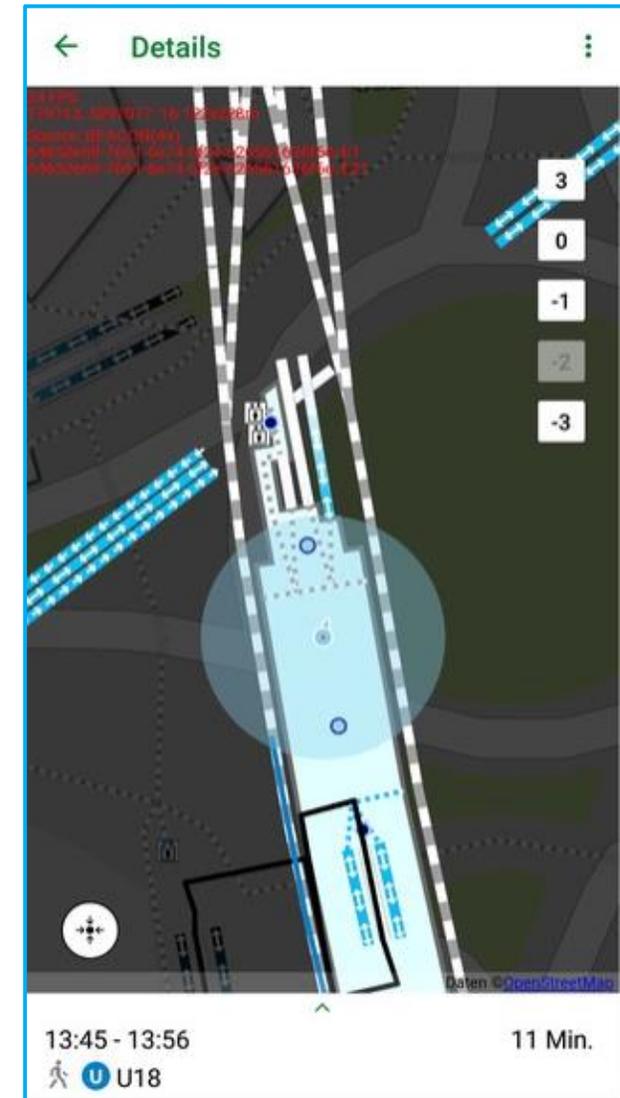
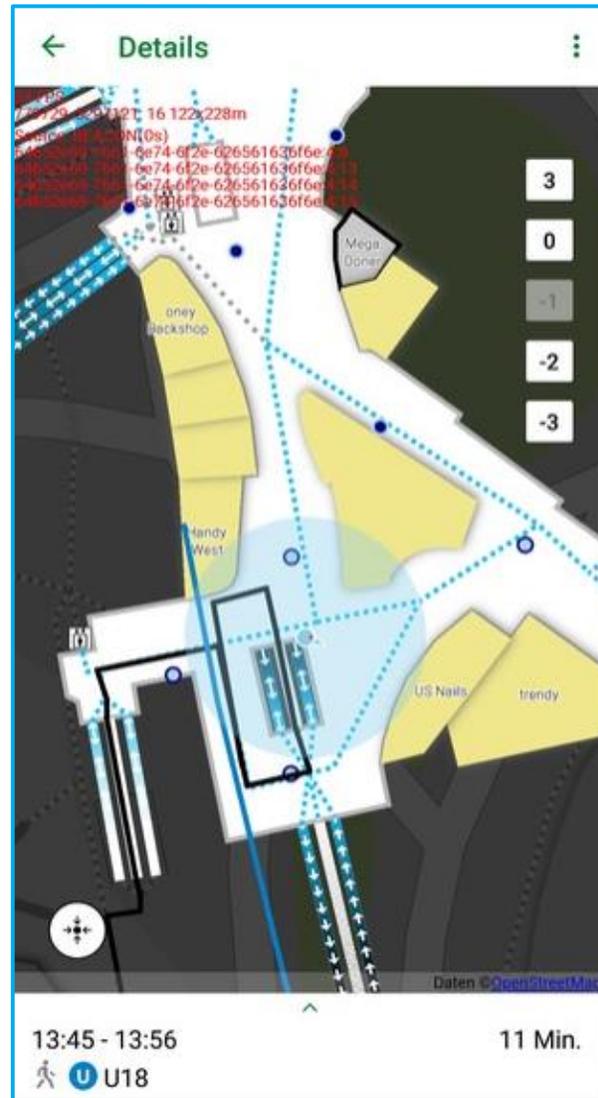
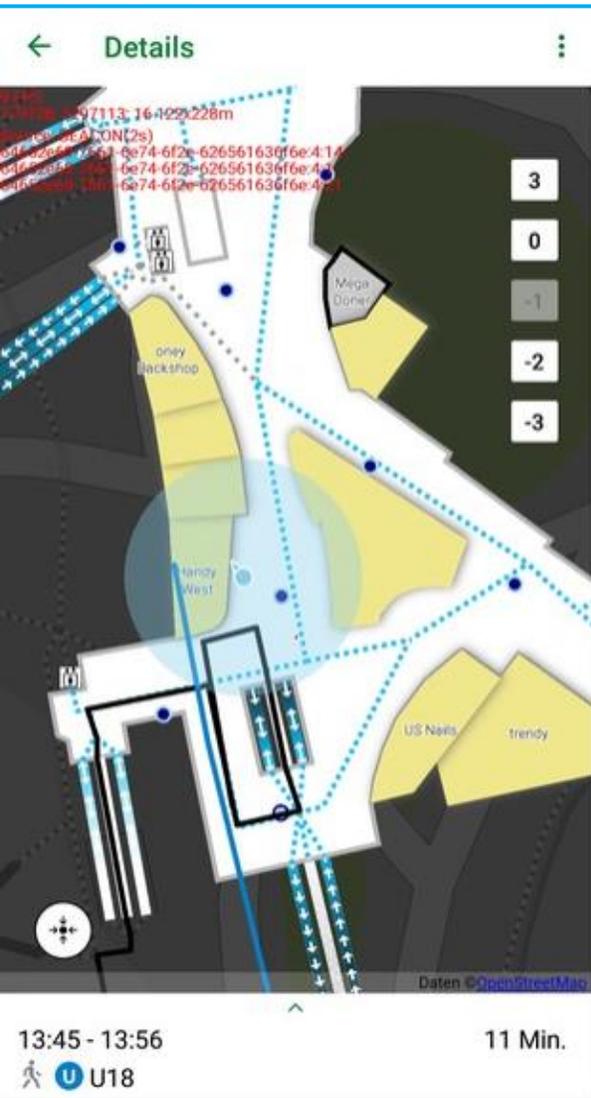
Key	Value
beacon:major	4
beacon:minor	14
beacon:type	bluetooth
beacon:uuid	64652e69-7661-6e74-...
indoormark	beacon
level	-1
ref:pt_id	de:05113:9153:6

Version 2 created on 22/03/18 15:52
 User: EJ
 Changeset: 57425723
 Beacons eingepflegt
 Source: knowledge

Key	Value
beacon:major	4
beacon:minor	13
beacon:type	bluetooth
beacon:uuid	64652e69-7661-...
indoormark	beacon
level	-1
ref:pt_id	de:05113:9153:6



step-by-step navigation in apps based on OpenStreetMap



Thank you for your attention!

Contact:

- kutlu@mentz.net
- www.mentz.net

References:

- <https://accent-systems.com/product/ibks-plus/>
- http://www.accent-systems.com/wp-content/uploads/iBKS_Plus_datasheet_rev2.pdf
- <https://developer.apple.com/ibeacon/>
- <https://developer.estimote.com/eddystone/>
- https://play.google.com/store/apps/details?id=com.accent_systems.ibks_config_tool