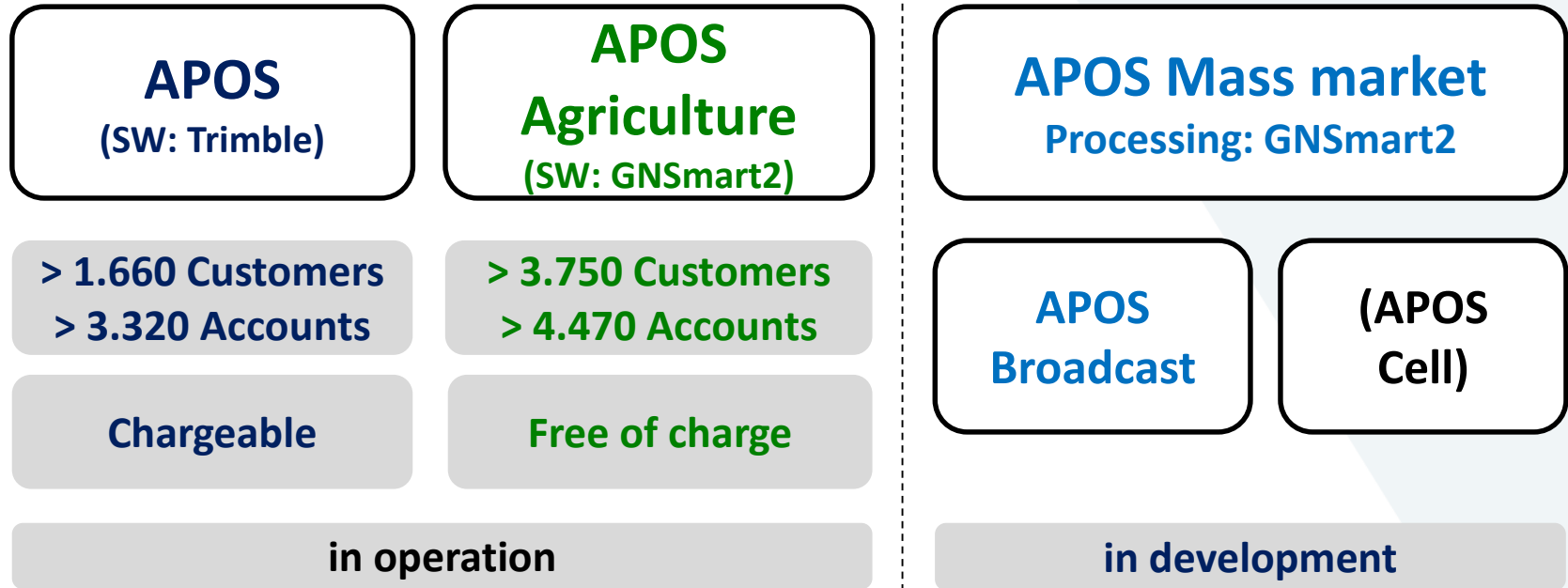


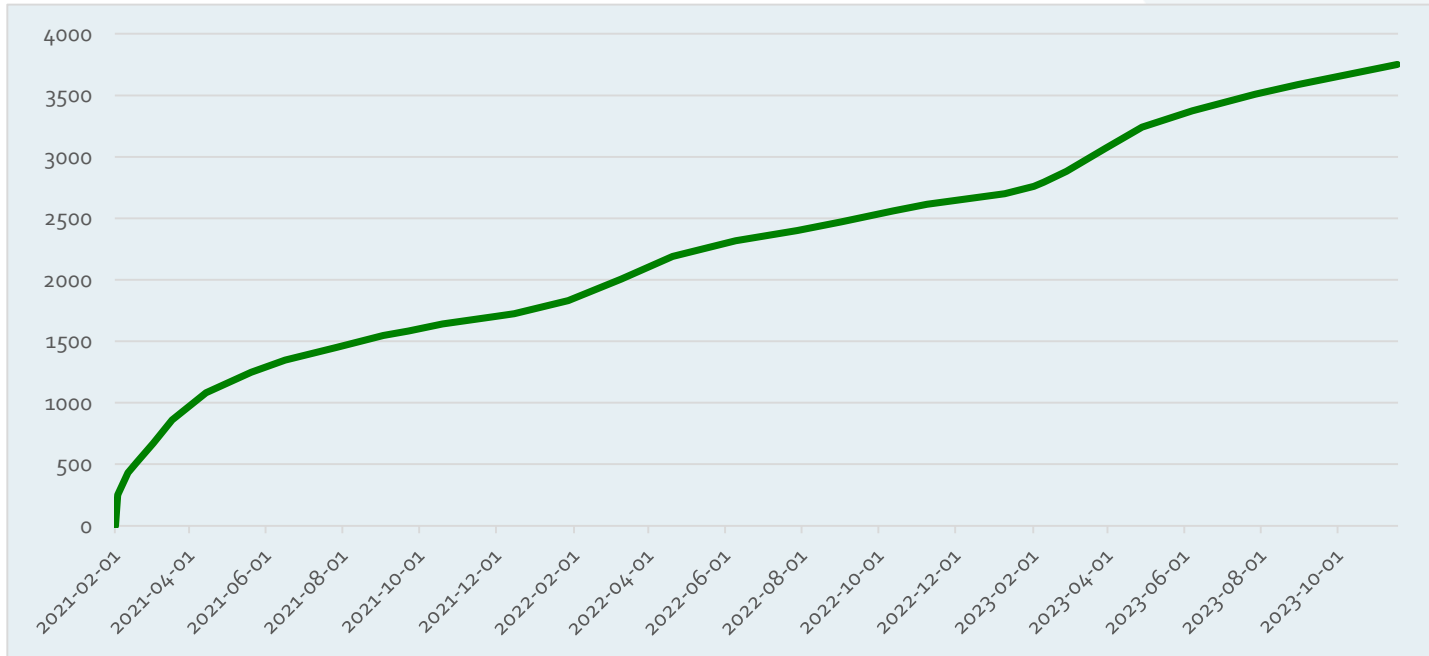
APOS for the mass market

Ernst Zahn, APOS/BEV - Austria
EUPOS, 9th EUPOS technical meeting 11/2023, Riga

APOS Realtime-services at a glance



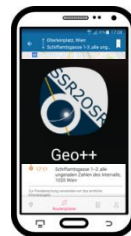
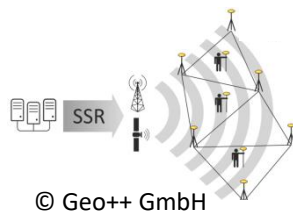
APOS for Agriculture – development of customer numbers



**2-4 New
registrations
per day**

**Trouble-free
operation since
February 2021**

APOS Broadcast



Transmission of correction grid streams
(Ionosphere, Troposphere)

Transmission channels:

First of all: **Mobile Internet**

Optionally: **DAB+ digital radio**

Transmission formats:

SSRZ^{*)} (Geo++)

RTCM^{)}** (as soon as standardized)

Classic receivers first (!) require an upstream APP to be able to use the transmission signal

**APP: Conversion of grid streams into classic virtual reference station
APP free of charge on cell phone**

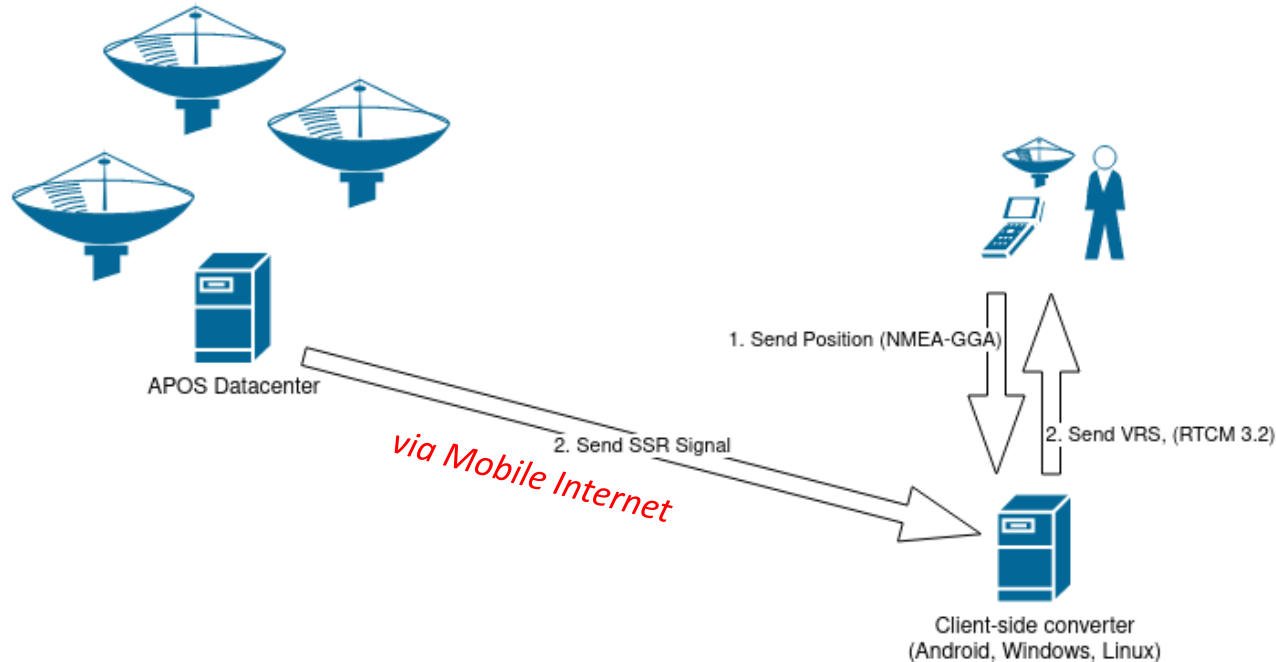
**APP necessary up to RTCM standard
and useful beyond**

Computing load at customers

^{*)} State Space Representation - compressed ... State space representation along the GNSS signal path in compressed form

^{**)} Radio Technical Commission for Maritime Services ... Standard format for the transmission of GNSS correction and raw data

APOS-Broadcast using the Geo++ SSR2OSR Converter app



APOS Broadcast - BEV activities to date (excerpts)

✓ **Transmission of correction grid streams successfully tested (GPS, GLONASS, GALILEO and BEIDOU-III)**

✓ **Installation of BEV internal server as fallback system**

✓ **Various optimizations carried out (e.g. acceleration of subnet processing for timely stream provision, etc.)**

✓ **APP performance tests carried out directly and indirectly (e.g. via smartphone) on end devices from various manufacturers (including Trimble etc.)**

✓ **Setting up external APOS broadcast cloud servers (to prevent any bandwidth problems)**

(In evaluation)

6 sub-networks (+/-)

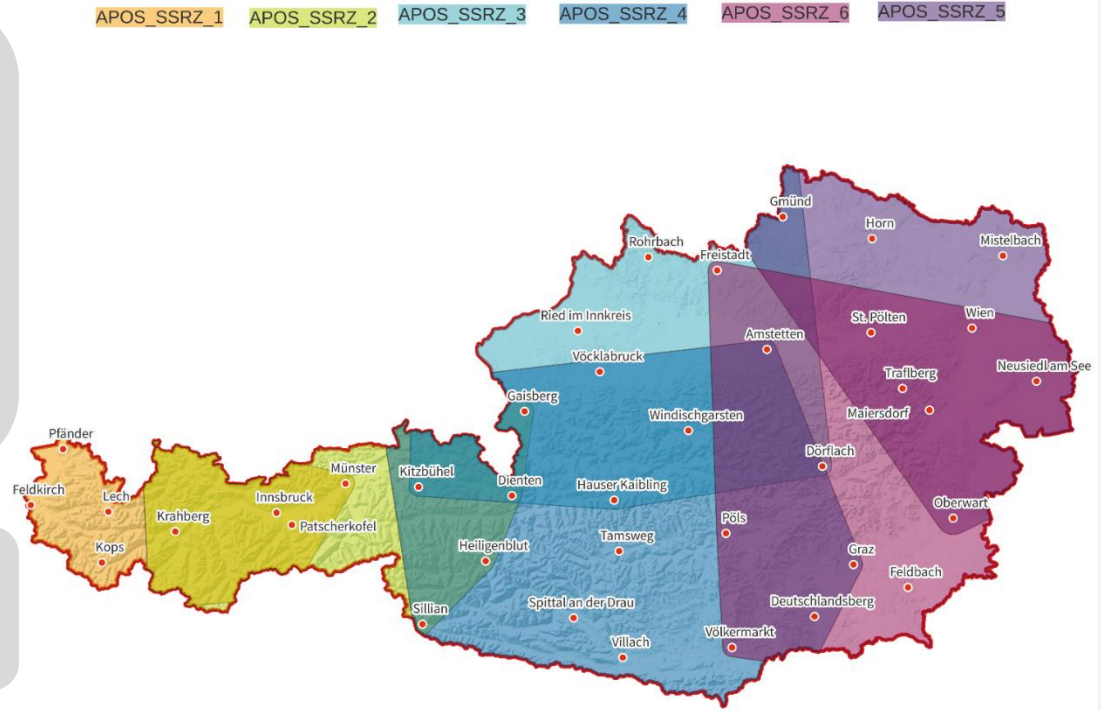
mainly due to additional BDS
processing



6 Mountpoints

redirecting via SSR2OSR App

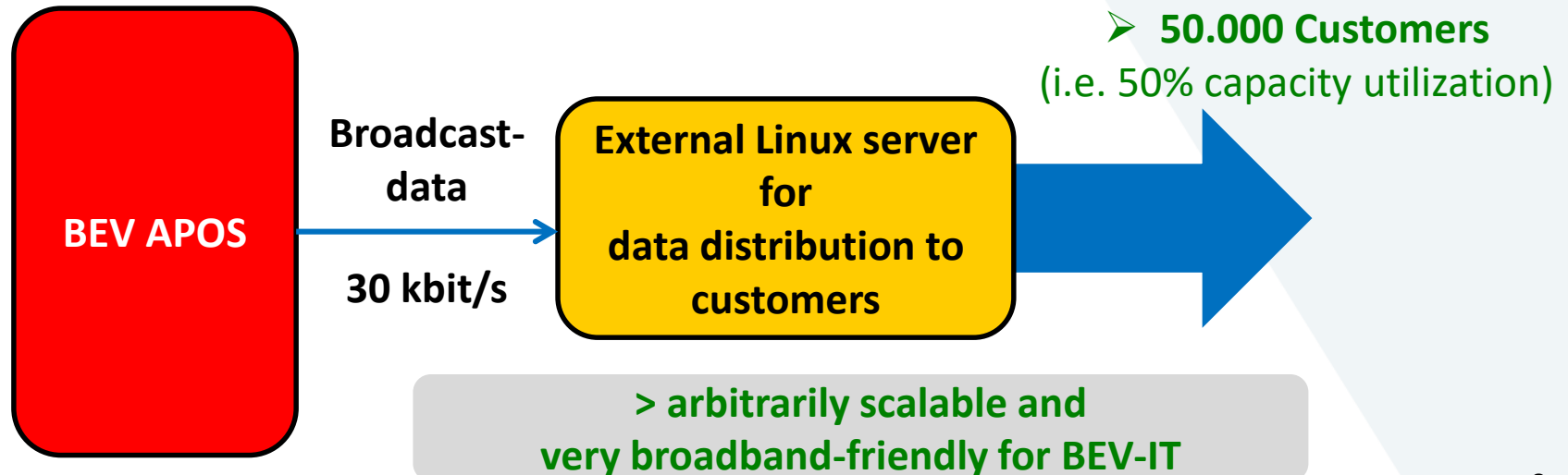
≈ 8 kbit/s per sub-network





How to solve the "bottleneck" bandwidth?

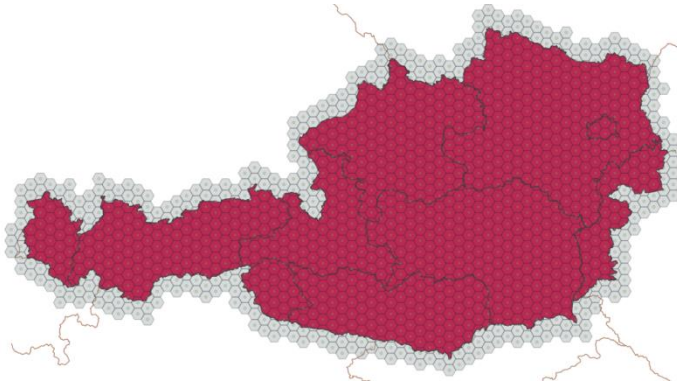
Using a Linux cloud server upstream of the BEV infrastructure as a data distributor ...



APOS Cell

Austria is divided into regular cells (approx. 1,300)

A virtual reference station (VRS) is calculated for each cell (radius approx. 5 km)



**Constant computing load in the
processing center**

Customer doesn't need an APP

“Classic” receivers can be used

**The customer receives the VRS from
the cell in which they are located**

Differences: APOS <-> APOS Broadcast SSRZ <-> APOS Cell

	APOS	APOS SSRZ	APOS Cell
cm-position	yes	yes	yes
without APP	yes	for now (no)	yes
TTFB	< 10 sec	< 20 sec	< 10 sec
Transmission format	RTCM	SSRZ	RTCM
computing load in the processing center	large, per customer	small, customer-independent	constant (1,300 cells)

Thank you for your attention!

Ernst Zahn, APOS/BEV - Austria
EUPOS, 9th EUPOS technical meeting 11/2023, Riga