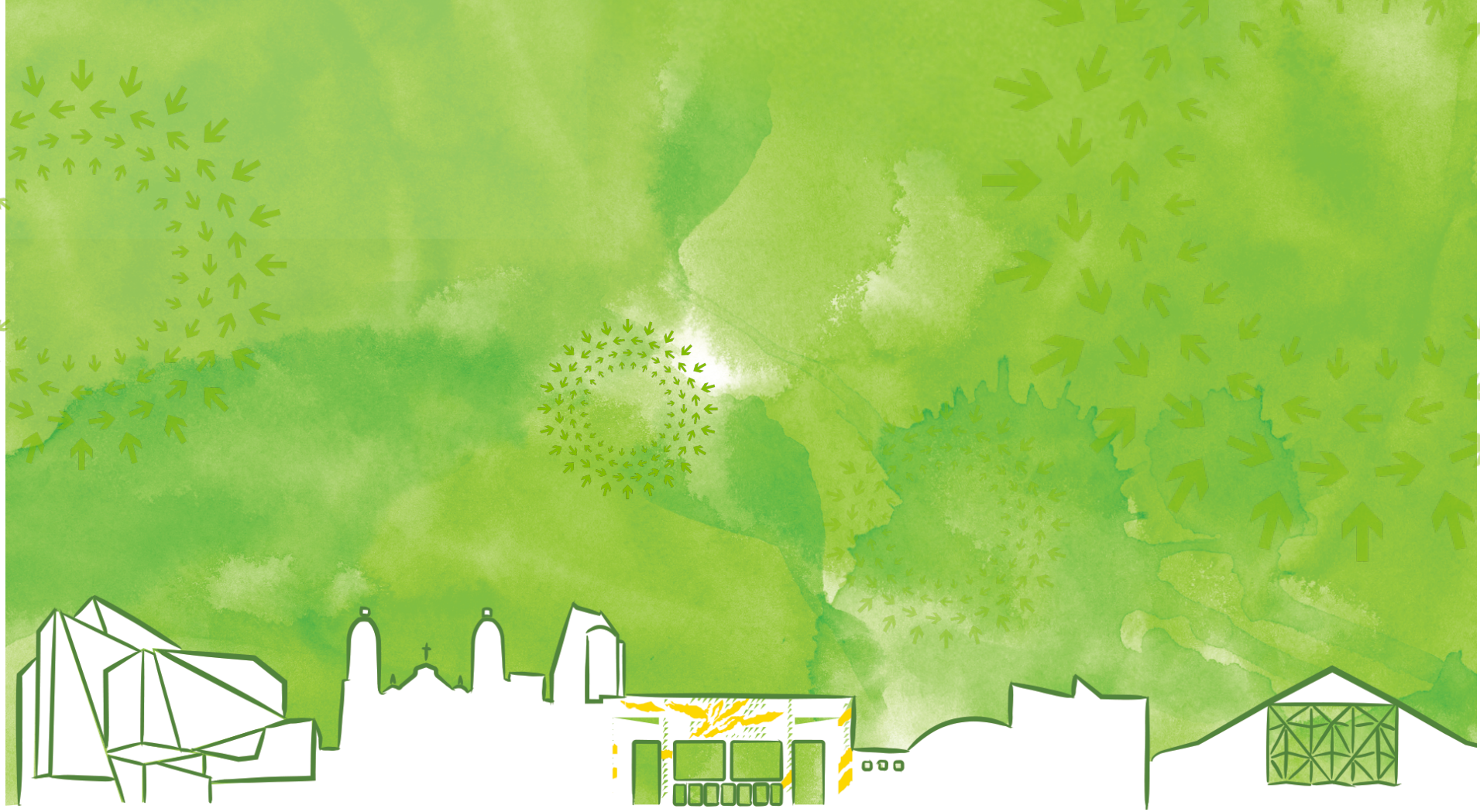

OCP U.S. SUMMIT 2016

March 9-10 | San Jose, CA

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Open Rack enhancements for regulatory approvals and support for telco use cases

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Open Rack enhancements for regulatory approvals and support for telco use cases

Nokia vision of Enhancement areas and project targets

- Starting point current ORv2 specification
- Maintain compatibility with ORv2 compute and storage designs
- EMI shielded system design
- Single rack seismic tolerance
- Power capacity increase
- Introducing Telco -48VDC power feed option

Need of requlatory approvals

- When selling OCP open rack in multiple markets manufactures must comply with each markets regulations
- EMI shielding not designed in to ORv2.

CE marking is a mandatory conformity marking for certain products sold within the European Economic Area (EEA). Most electrical products must comply with the Low Voltage Directive and the EMC Directive The CE marking is also found on products sold outside the EEA that are manufactured in, or designed to be sold in, the EEA. This makes the CE marking recognizable worldwide even to people who are not familiar with the European Economic Area. It is in that sense similar to the FCC Declaration of Conformity used on certain electronic devices sold in the United States.

EMC compliant OCP rack ORVX

- Design challenge to fight against increasing frequency spectrum.
- Transition from 10G Ethernet transport to 25/50/100G Ethernet

f [GHz]	λ [cm]	λ/2 [cm]	λ/16 [mm]
10,3125	2,9	1,5	1,8
25,78125	1,2	0,6	0,7

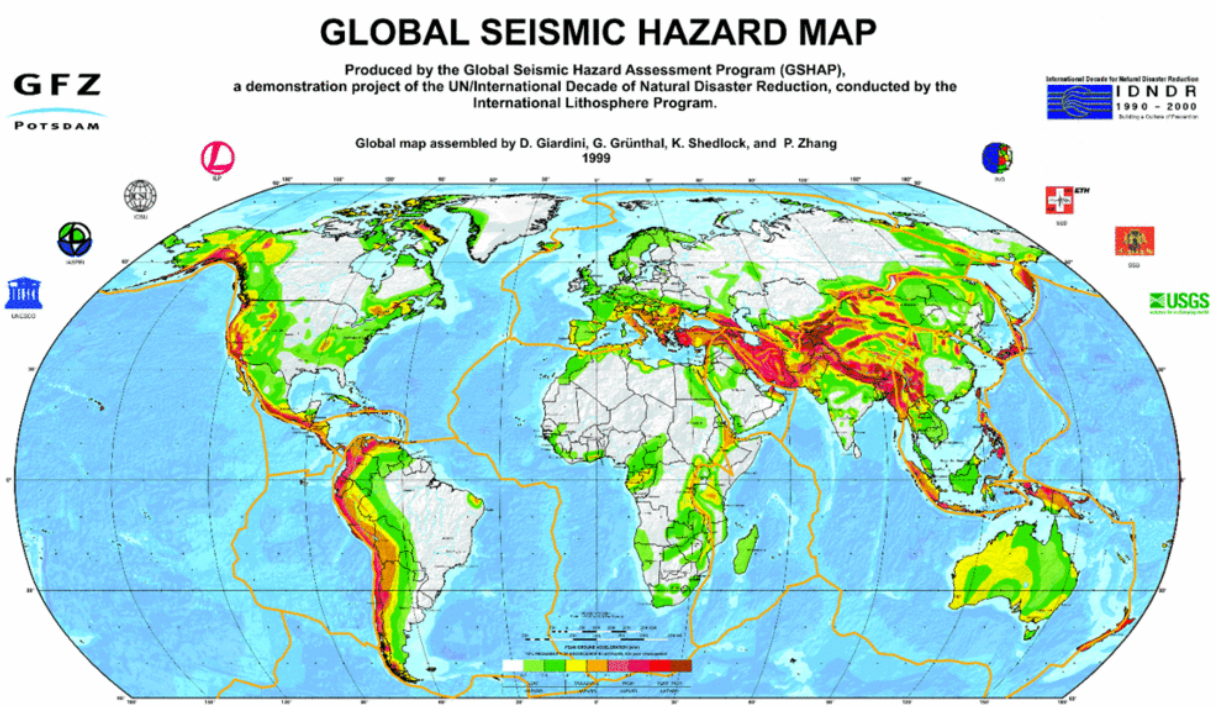
- Fine mesh structures needed in door design to maintain same time the low air pressure drop and EMI shielding. Max ~2mm openings in rack
- EMI shielded doors, side panels, cable openings
- Need to fulfill single rack seismic compliance at same time

Need of seismic compliancy

Substantial portion of world largest cities = dense telco networks lies in region with significant seismic risk!

About 10% of Earth's surface is occupied by high or very high seismic hazard zones.

About 70% of land mass lies in relatively low hazard zones.



Open Rack ORVX seismic compliance targets

- To be tested against GR-63-CORE shaking and static horizontal pull test criteria
- To be verified with 850kg IT-load installed in rack
- Single rack NEBS seismic risk Zone 2 compliance
- NEBS seismic risk Zone 4 compliance Dual or more racks in single rack row
- EMC and safety criteria fulfilled simultaneously with seismic criteria

Need of -48VDC in telco applications

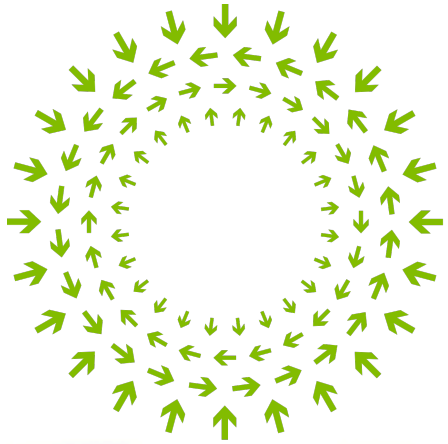
- Telco operators have need to utilize their existing site infrastructure with existing -48VDC power feed
- Limited possibilities to build new datacenters / central office locations in urban areas

Redundant Telco -48VDC power feed option

- Redundant feed cables, n+1 power modules at power shelf
- 12,5kW per power zone (25kW total rack power)
- ETS 300 132-2 Power supply interface at the input to telecommunications and datacom (ICT) equipment; Part 2: Operated by -48 V direct current (dc)
- Earthing and bonding of the telecommunications equipment in telecommunications centres is covered by ETS 300 253
- EMC and safety criteria to be fulfilled as stand alone

Open Rack ORvx summary

- Target is to bring OCP rack variant that fulfill the regulatory EMC requirements - > OCP products can be sold commercially in multiple markets
- Seismic compliancy for NEBS Zone 2/4 -> Expanding the OCP market areas into seismic risk zones that substantial portion of world largest cities belongs to.
- Bring the Telco -48VDC option to OCP to serve Telco operators needs



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Compute Project