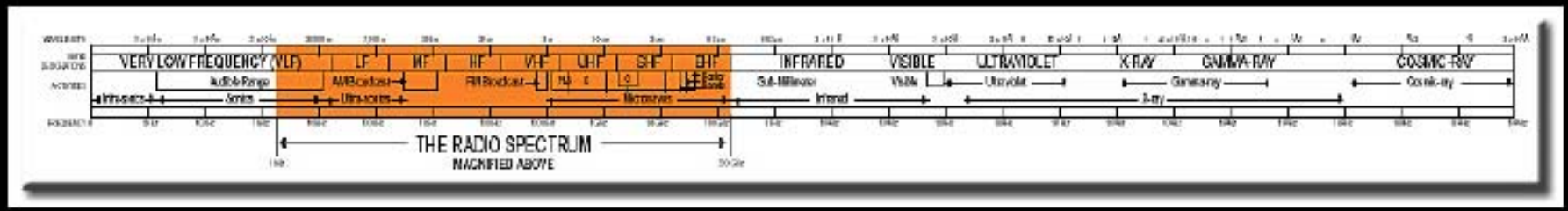
Beyond the Outer Limits

DARPA

XG

Next Generation Communications

Advanced Technology Office



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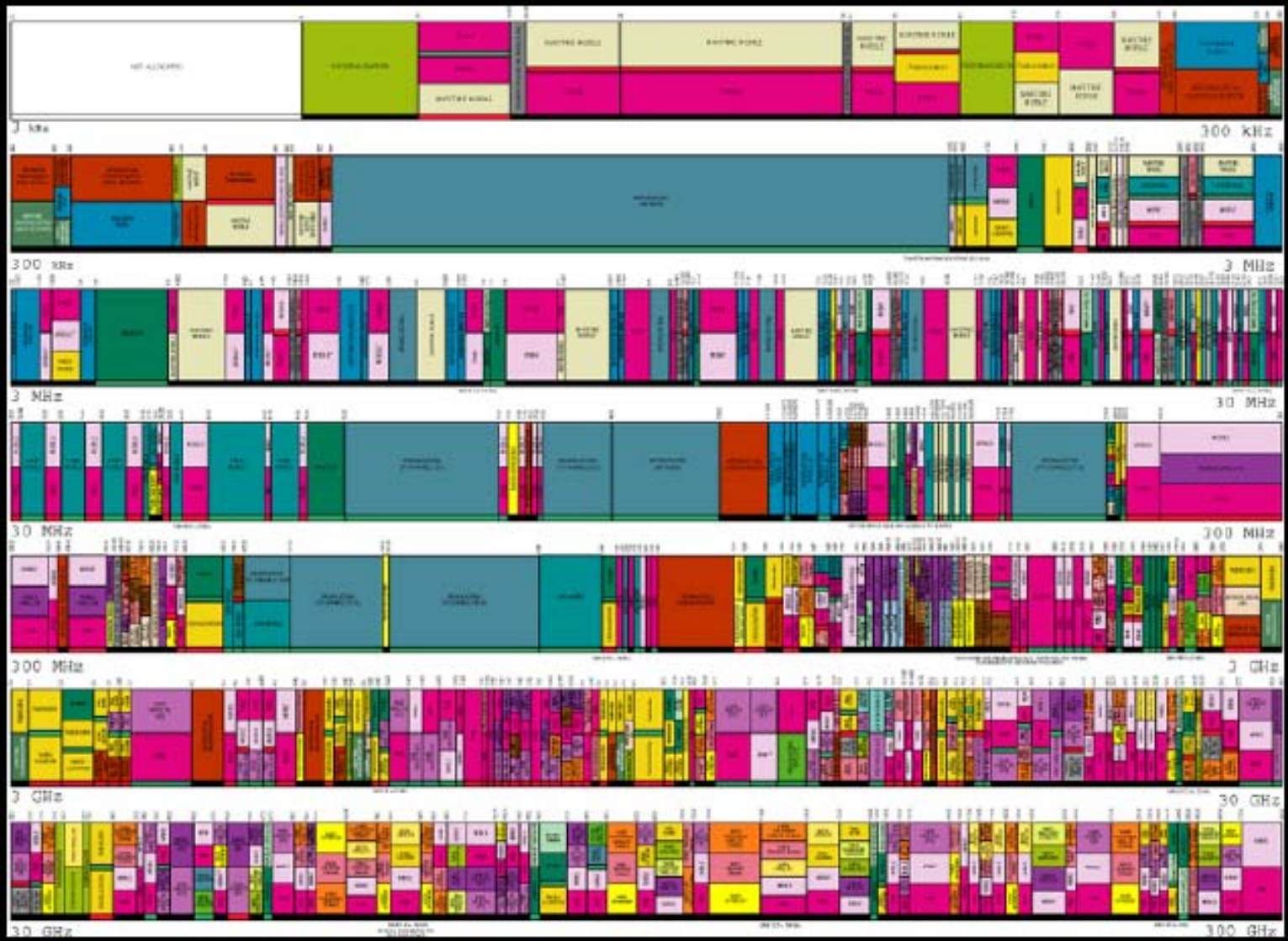

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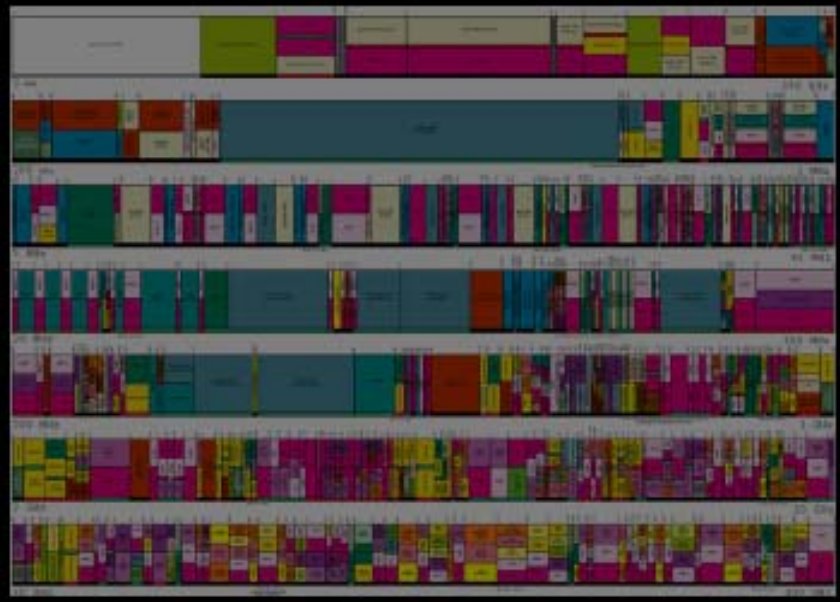

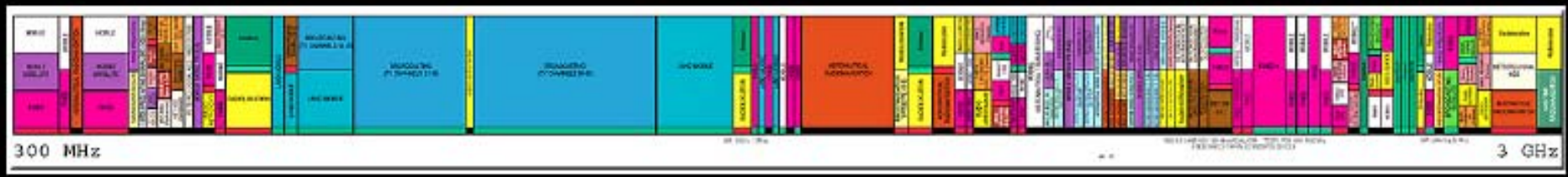

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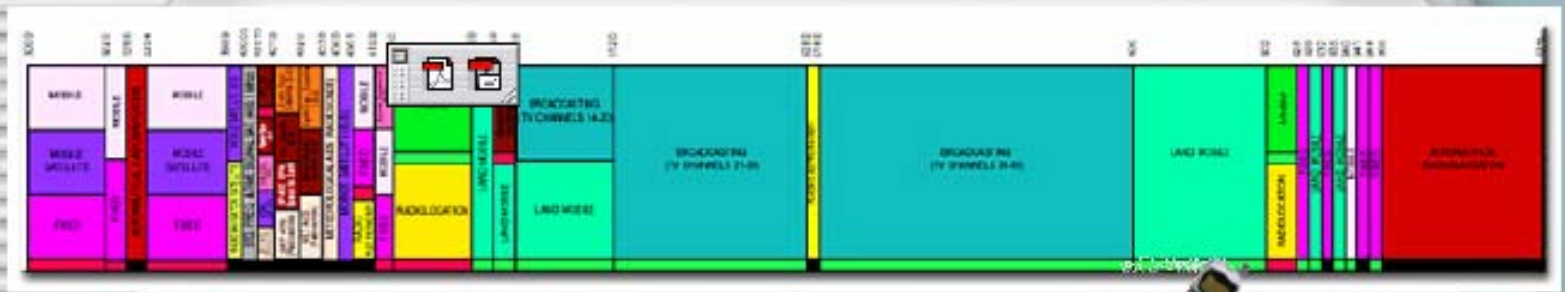

300 – 328.6 &
335.4 – 400 MHz(F)
Tactical Air/Ground/Air
Satellite Comm.
Search and Rescue
Tactical Comm.

400 - 410 MHz(S)
Space Ops.
Meteorological Aids

410 - 450 MHz(F)
BM Surveillance
Troop Position Location
Radiolocation
Auxiliary Broadcast

328.6 - 335.4 MHz(S)
Aeronautical
Radionavigation

450 - 512 MHz (NF)
Public Safety
Land Transportation
TV Broadcasting

512 - 806 MHz (NF)
TV Broadcasting

608 - 614 MHz(S)
Radio Astronomy

806 - 902 MHz (NF)
Public Safety
Land Transportation
Cellular
Mobile Satellite

902 - 960 MHz
Radiolocation
Auxiliary Broadcasting
Fixed/Land/Mobile

960 - 1215 MHz(S)
Aeronautical
Radionavigation

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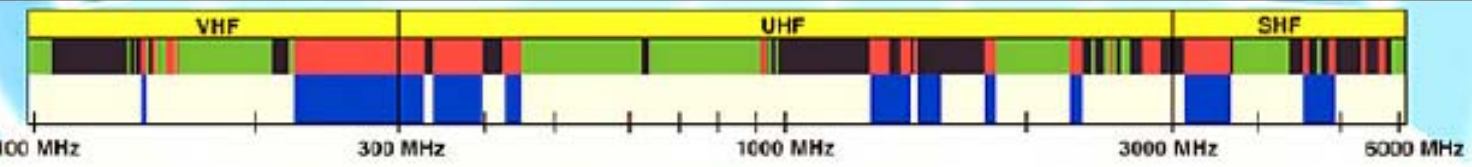

Selected Bands at Issue

138 - 144 MHz

Military Uses	Competing Uses
Land Mobile Radio	Little LEOs
Tactical Air / Ground / Air	Public Safety

225 - 400 MHz

Military Uses	Competing Uses
Tactical Air / Ground / Air	Little LEOs
Data Links	Public Safety
Satellite Comm	Terrestrial DAB
Military ATC	CMRS
Search & Rescue	Space Research
Executive Comm	
Tactical Comm	

400.15 - 401 MHz

Military Uses	Competing Uses
DMSP (↓)	MSS

420 - 450 MHz

Military Uses	Competing Uses
BM Surveillance and Early Warning Radars	Auxiliary Broadcast
Shipboard / Airborne Early Warning Radars	CMRS
Missile / Air Vehicle Flight Termination	Biomedical Telemetry
Troop Position Location	WLL
Anti-Stealth Radar	MSS
Foliage Penetration Radar	EES (active)

1215 - 1390 MHz

Military Uses	Competing Uses
Long / Medium Range Air Defense	MSS
Radio Navigation	NLMCS
Air Route Surveillance Radars	Wind Profiler Radars
Tactical Communications	
Test Range Support	
Air / Fleet Defense	
Drug Interdiction	
GPS	
Remote Satellite Sensors	
Nuclear Detection	

1435 - 1525 MHz

Military Uses	Competing Uses
Telemetry Supporting Entire Aerospace Industry	DAB / DARS
	MSS
	NLMCS

1755 - 1850 MHz

Military Uses	Competing Uses
DoD Satellite TT&C (↓)	PCS
Point-to Point Microwave	MDS
Air Combat Training Systems	3G Wireless / IMT 2000
Tactical Comm	
Tactical Data Links	

2200 - 2290 MHz

Military Uses	Competing Uses
DoD Satellite TT&C (↓)	PCS
Guided Missile Telemetry	MDS
Point to Point Microwave	WLL

3100 - 3650 MHz

Military Uses	Competing Uses
High Power Mobile Radars	MDS
Shipboard ATC	WLL
Missile Links	FSS
Airborne Station Keeping	

4400 - 4940 MHz

Military Uses	Competing Uses
Fixed Wideband Comm	GWCS
Mobile Wideband Comm	FSS
Command Links	Public Safety
Data Links	

ATC - Air Traffic Control
BM - Ballistic Missile
CMRS - Commercial Mobile Radio Service
DAB - Digital Audio Broadcast - Terrestrial
DARS - Digital Audio Radio Service - Satellite
DMSP - Defense Meteorological Satellite Program
FSS - Fixed Satellite Service
GPS - Global Positioning Satellite
GWCS - General Wireless Communications Service
IMT 2000 - 3rd Generation Mobile Telephony
LEO - Low Earth Orbit
MDS - Multipoint Distribution System
MSS - Mobile Satellite Service
NLMCS - New Land Mobile Communications Service
PCS - Personal Communications Service
TT&C - Tracking, Telemetry and Command
WLL - Wireless Local Loop

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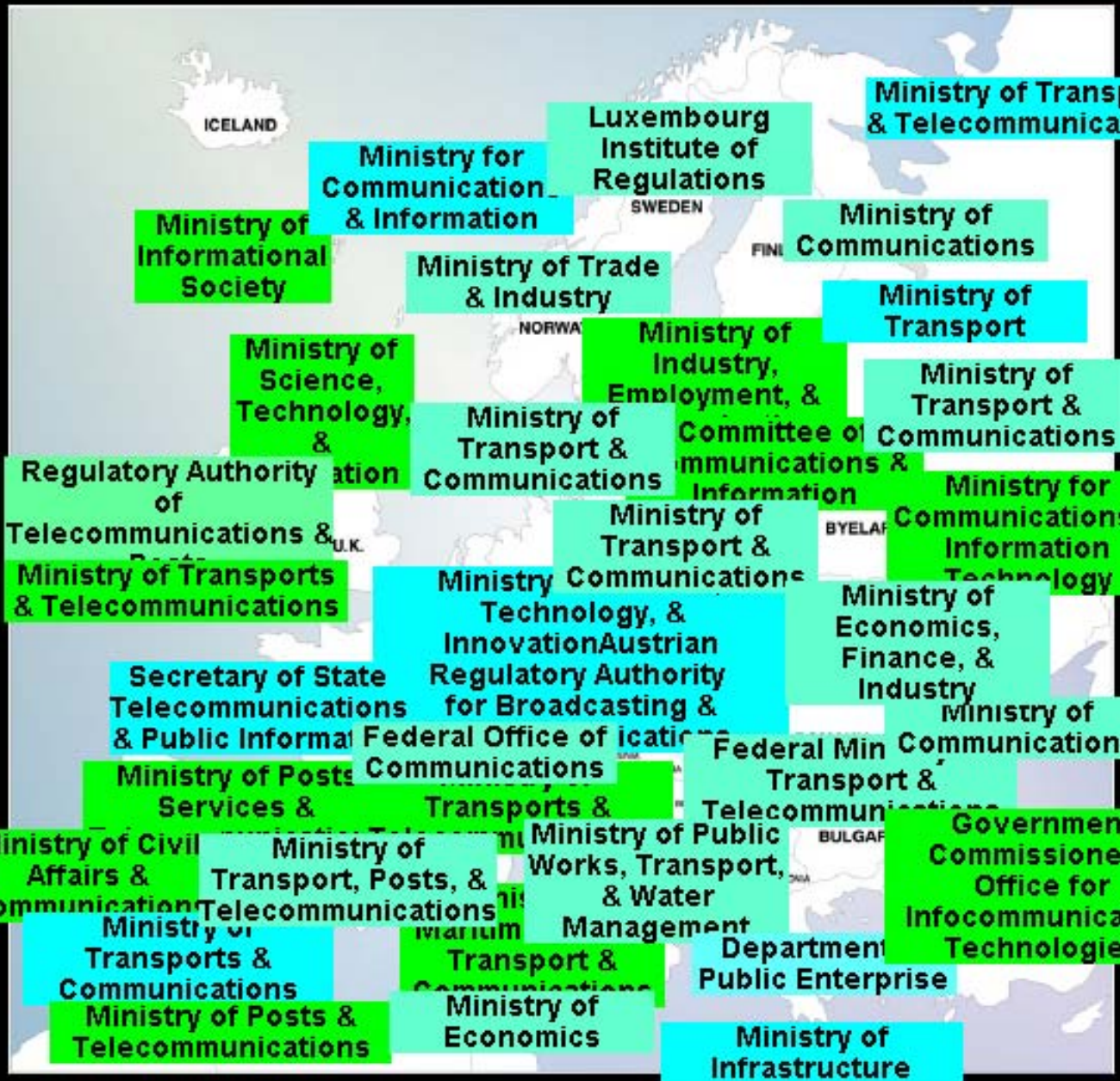

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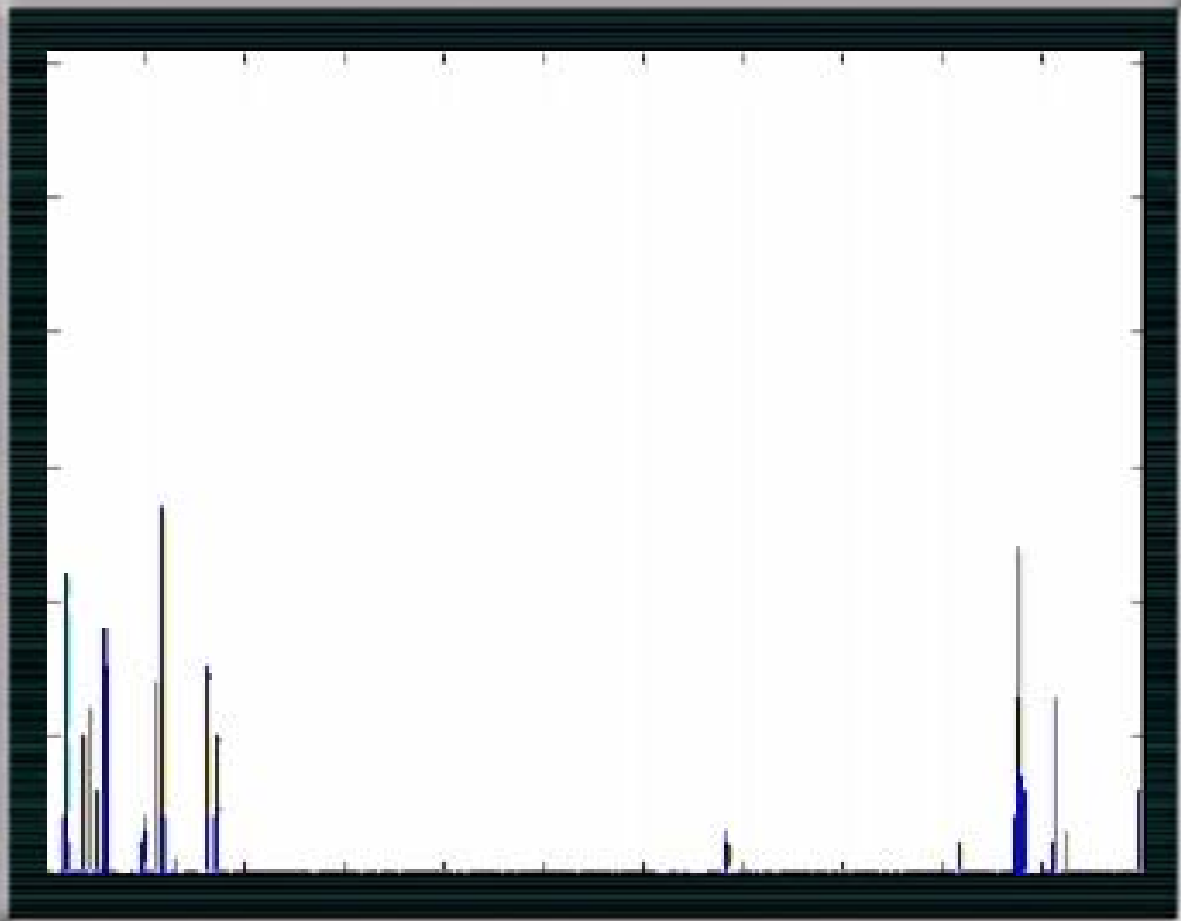

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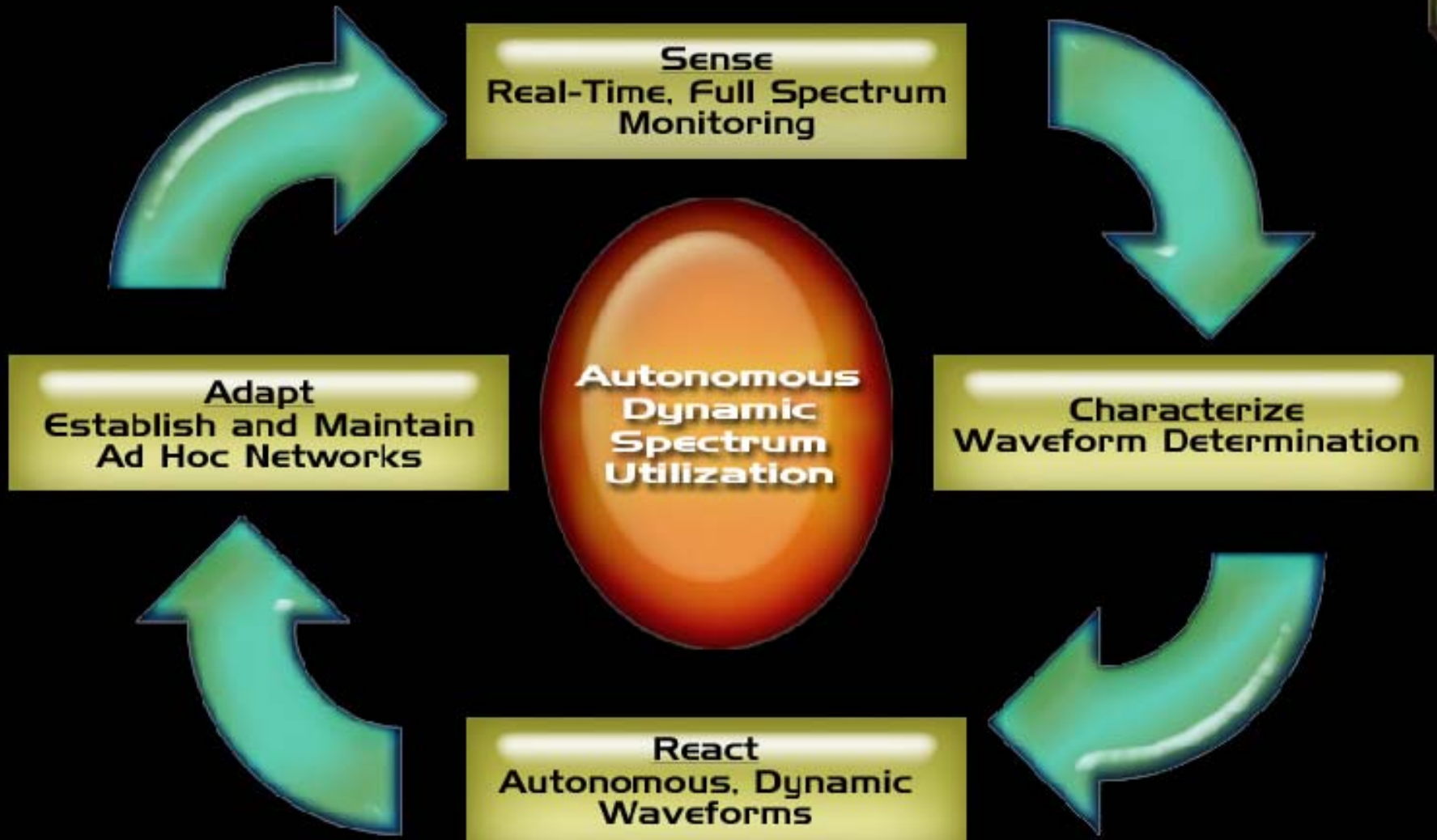
XG Key Technologies



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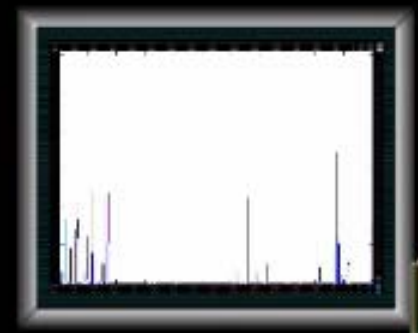
Sensing the RF Environment



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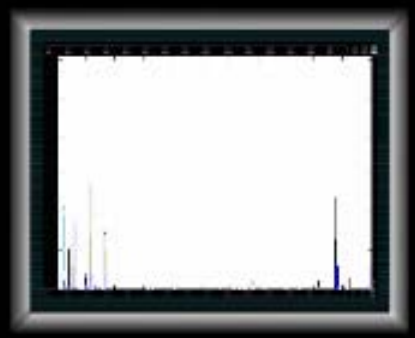
Characterizing the RF Environment



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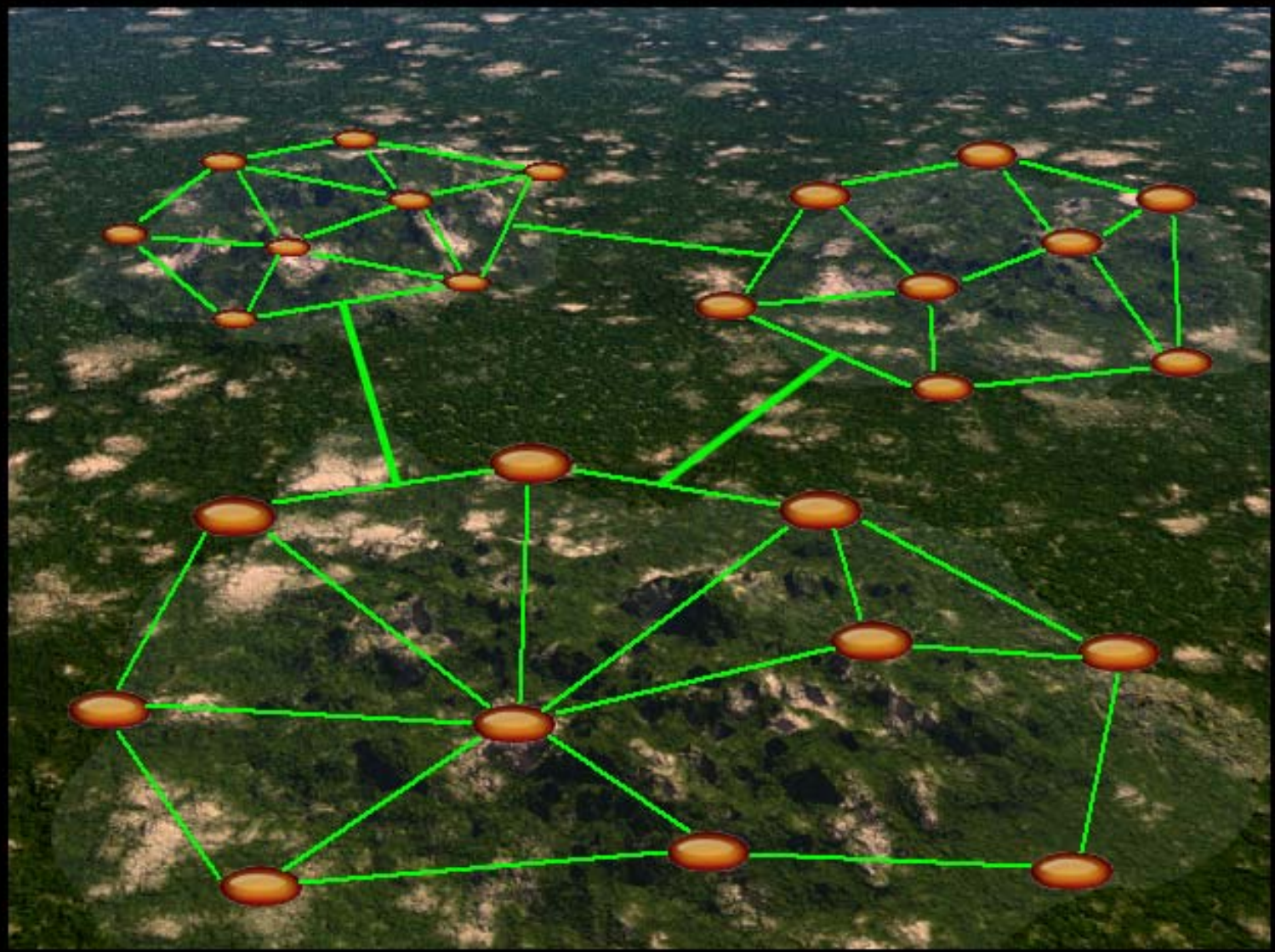
XG Key Technologies React



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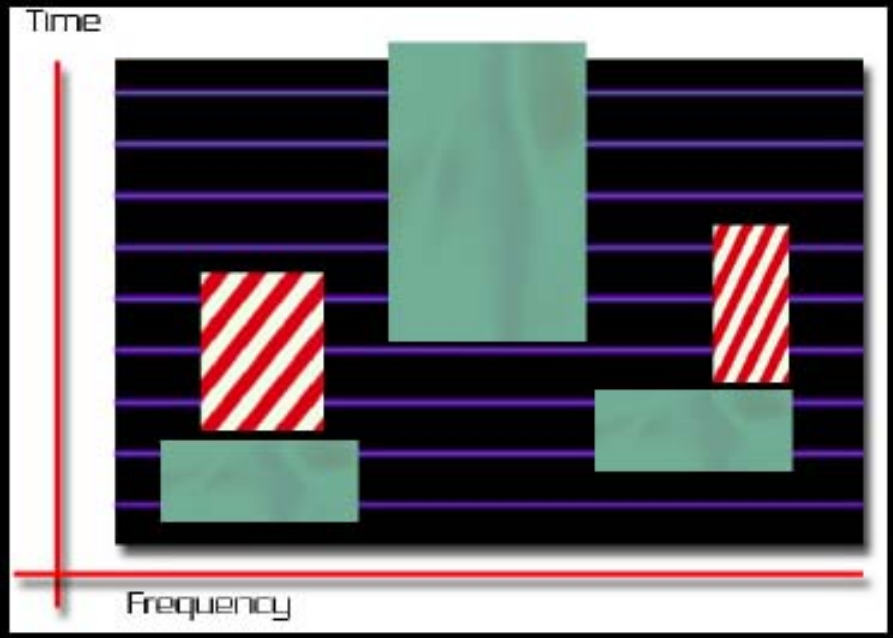
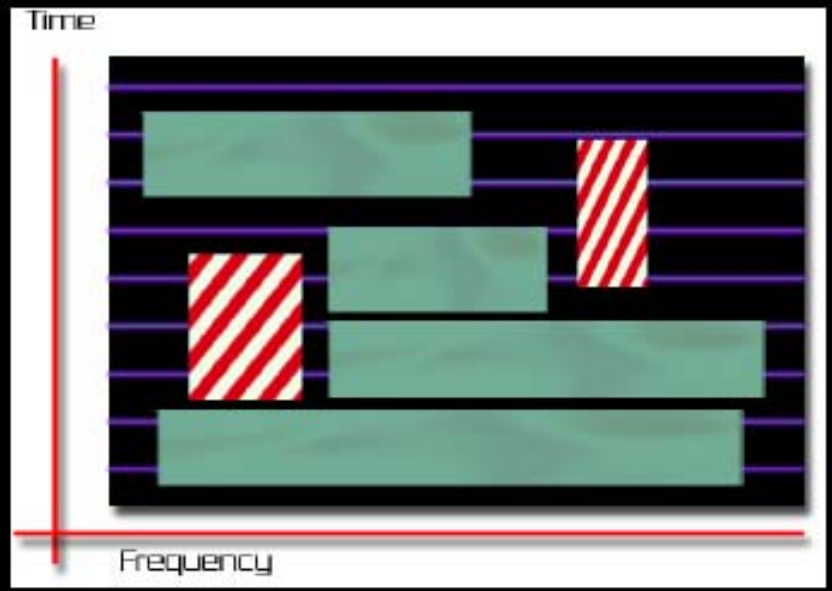
XG Key Technologies Adapt





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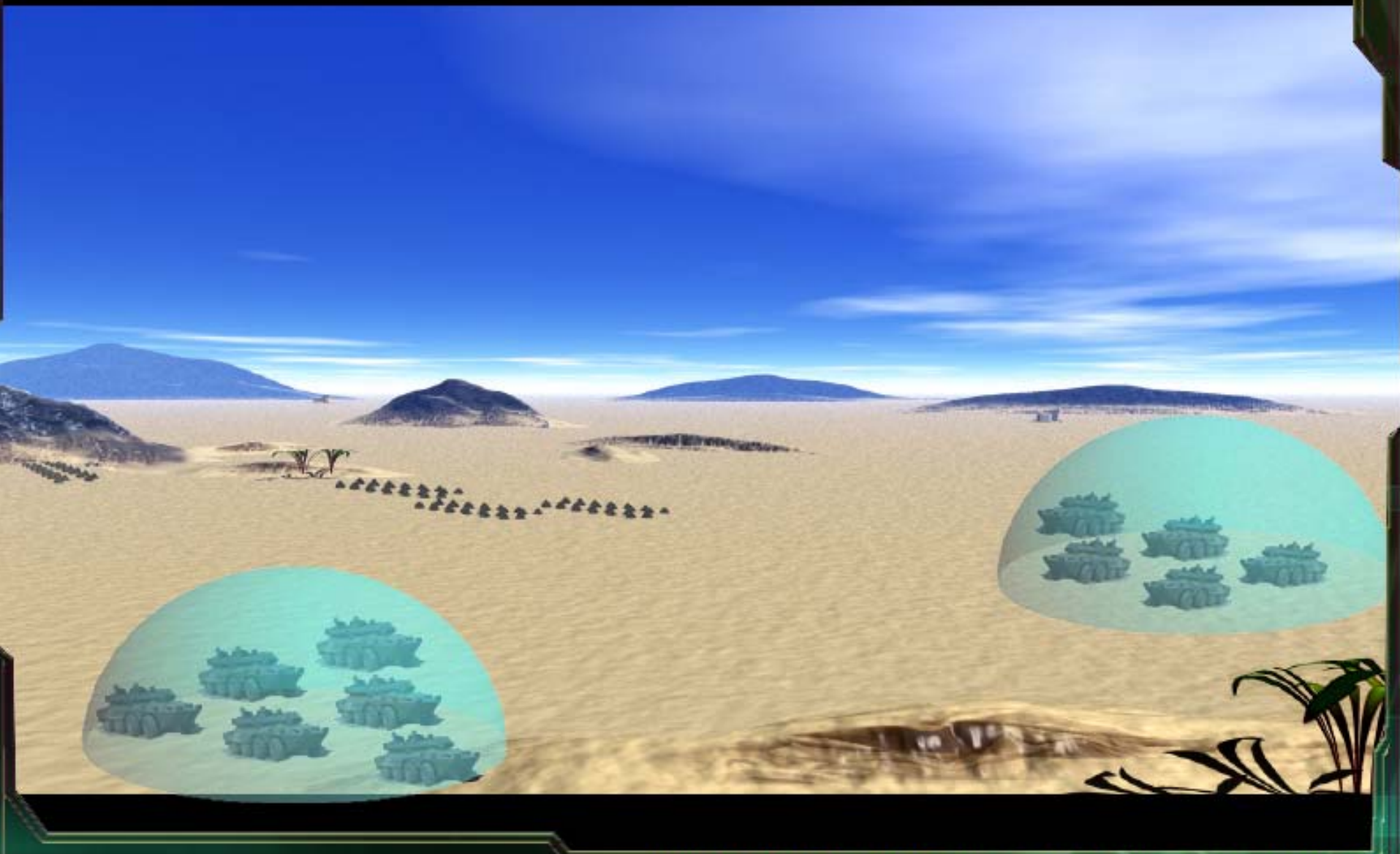
US Military Spectrum Density



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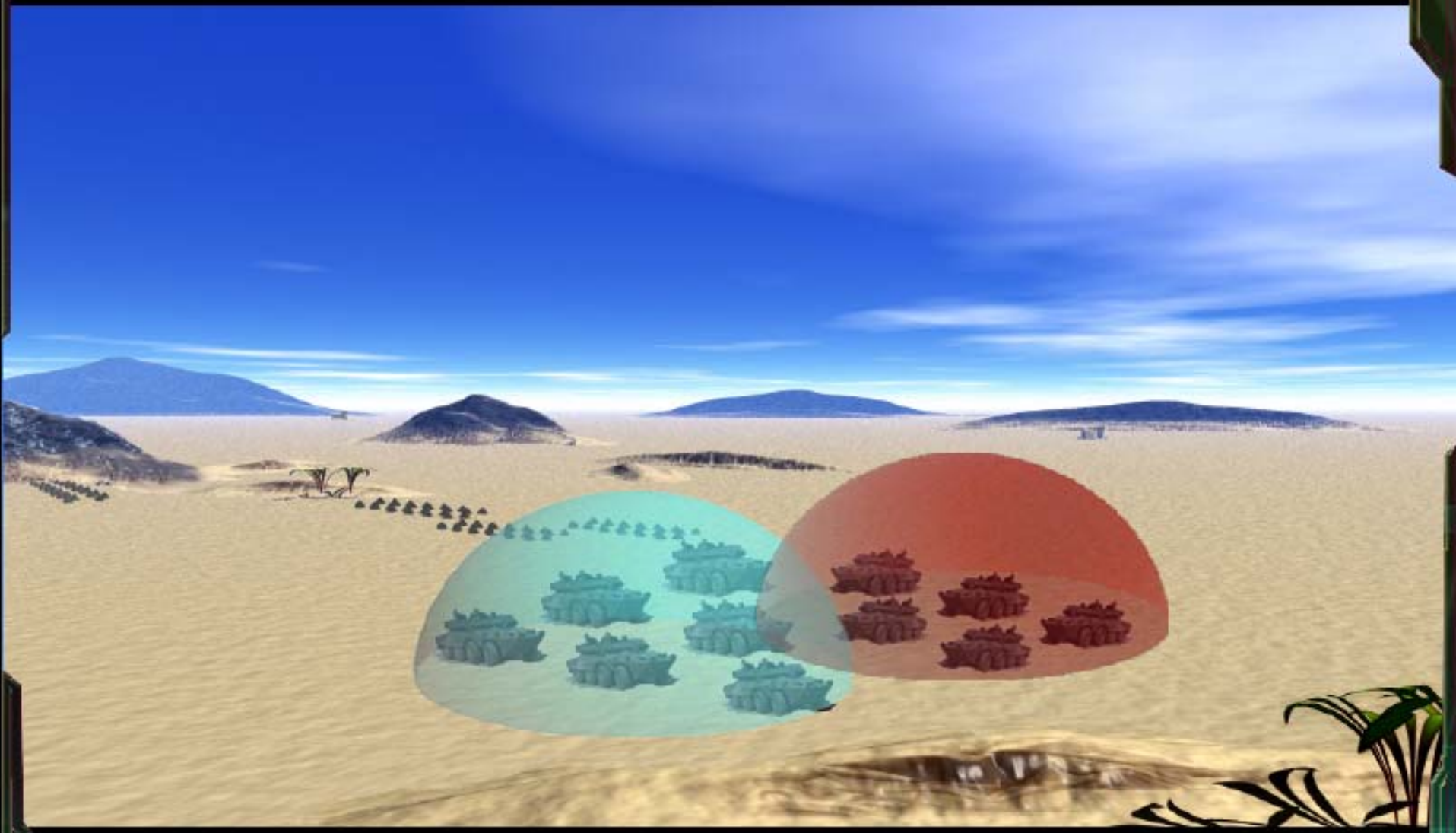
US Military Spectrum Density



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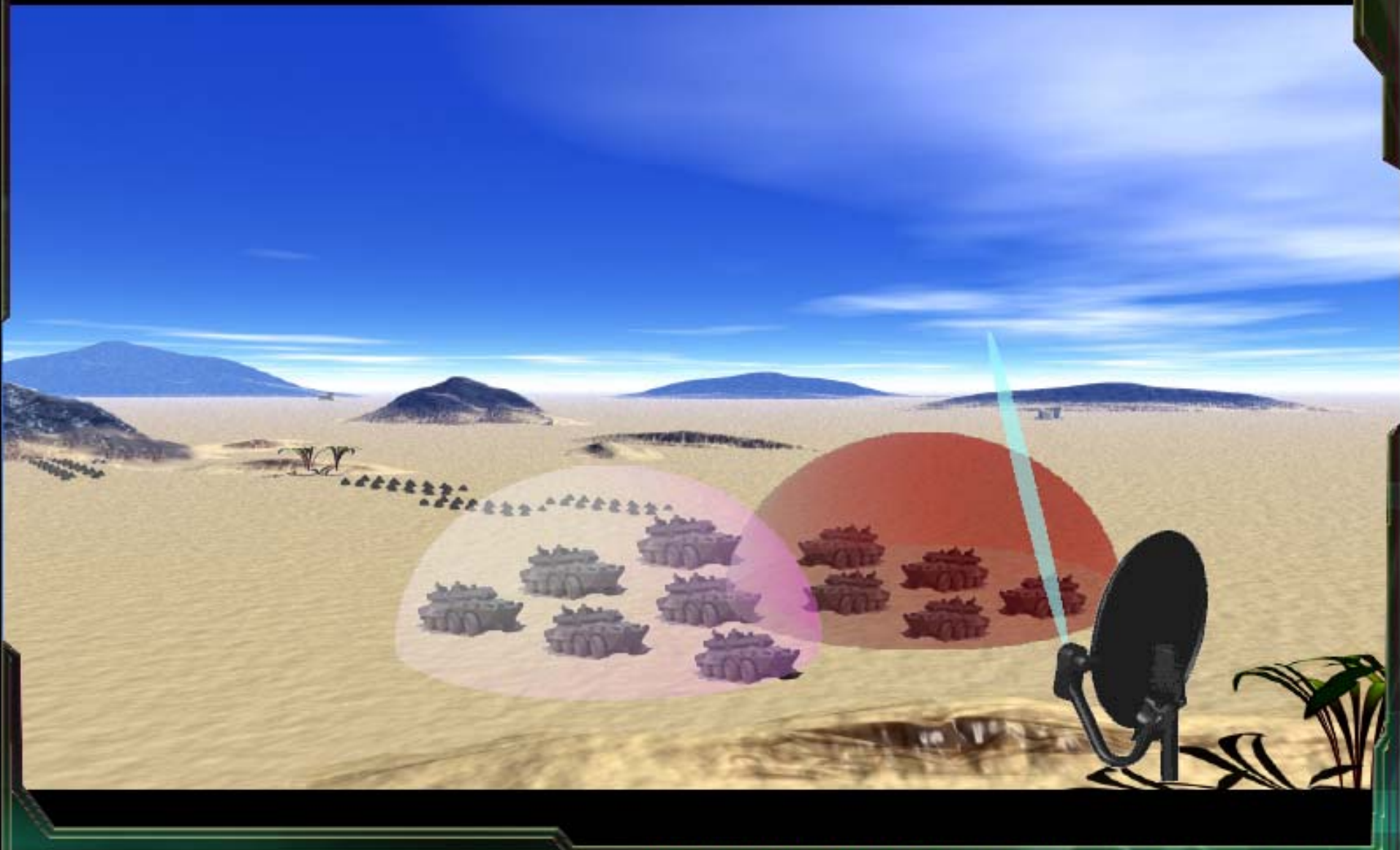
US Military Spectrum Density



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FY02	FY03	FY04	FY05	FY06

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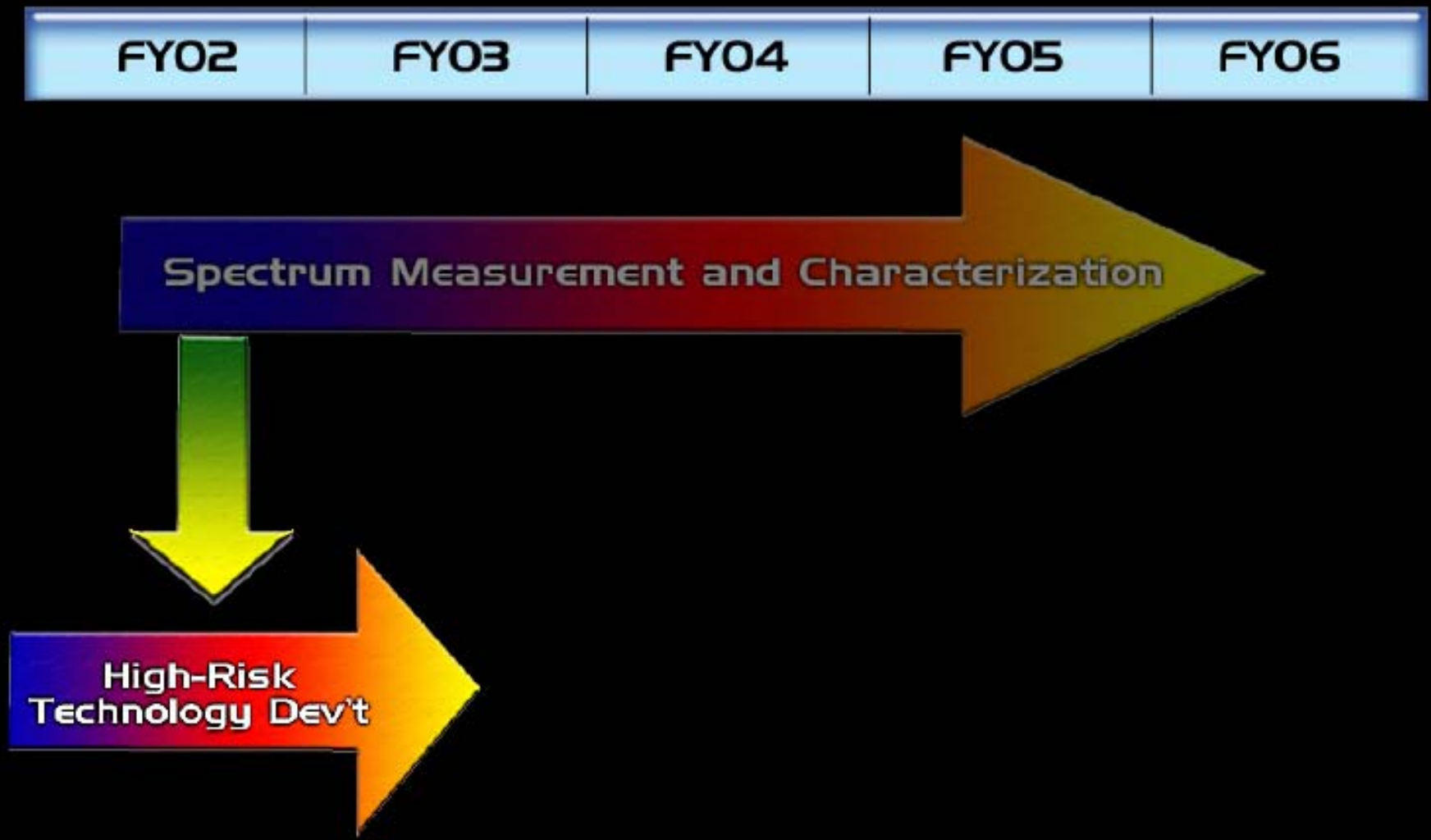

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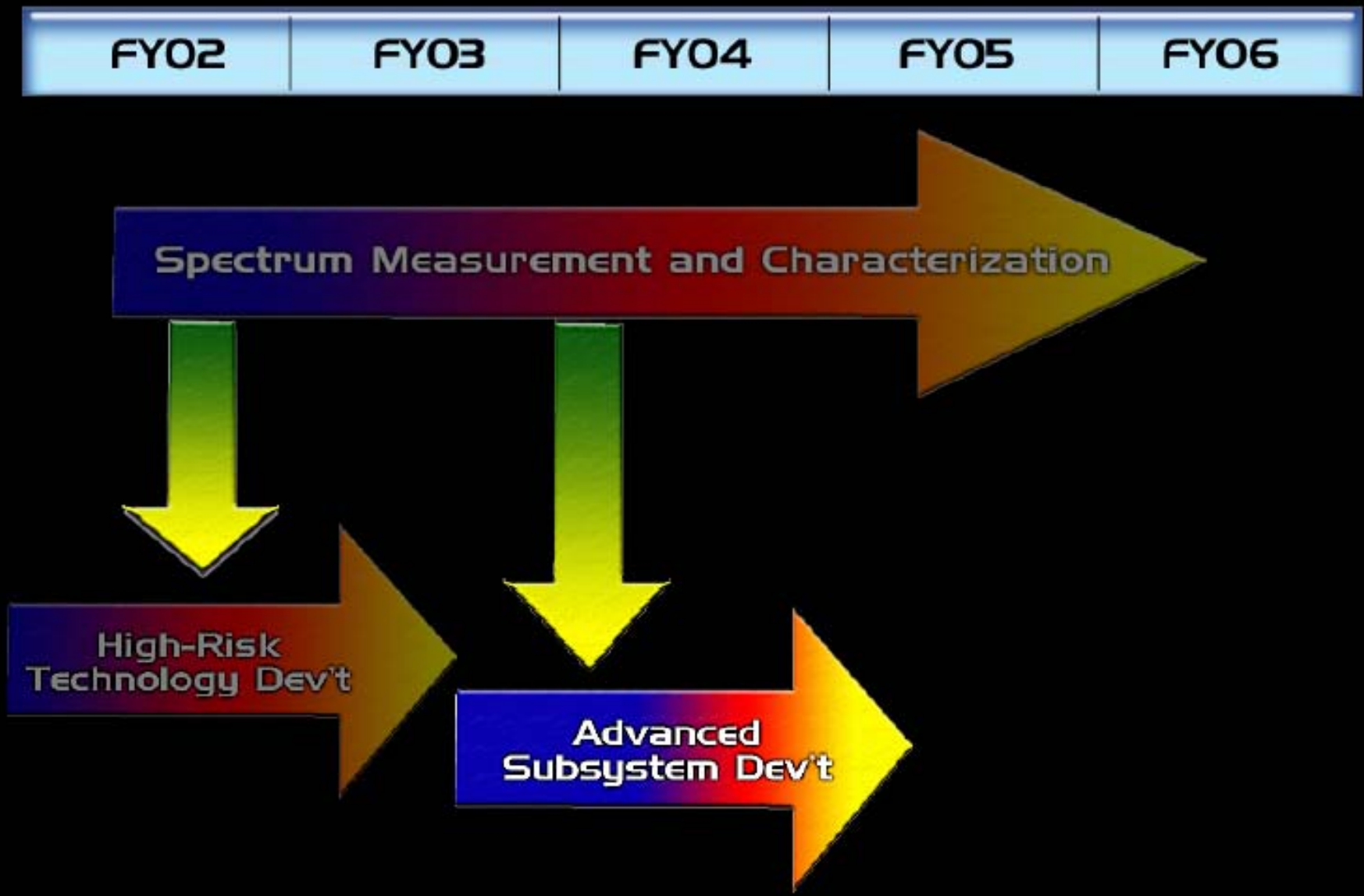

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Three Benefits of Civilian XG Use

- Need Favorable National / International Regulatory Environment
- Reduce Civilian Pressures on Military Spectrum
- High Civilian Production Volumes Reduce Military Costs

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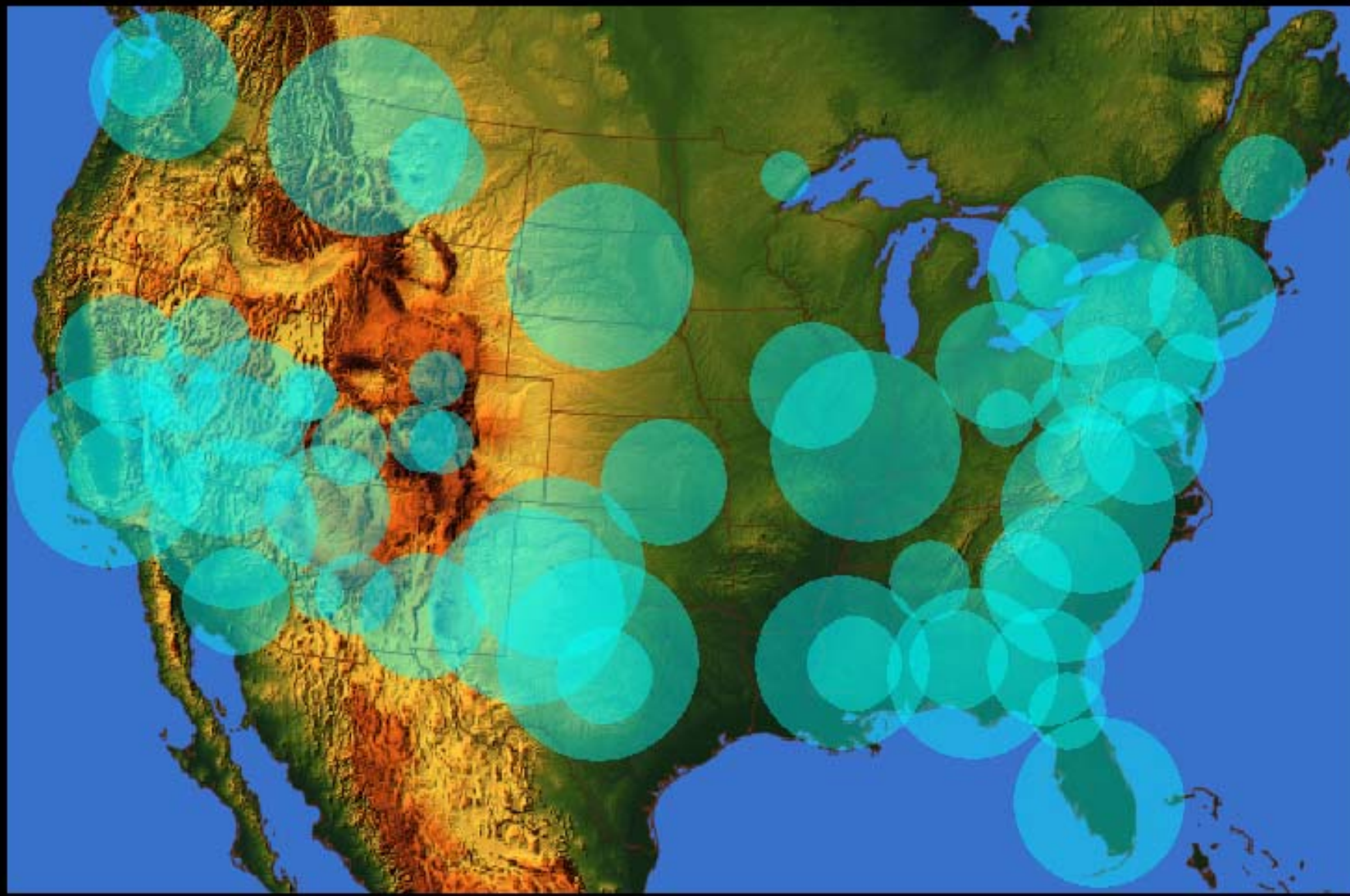

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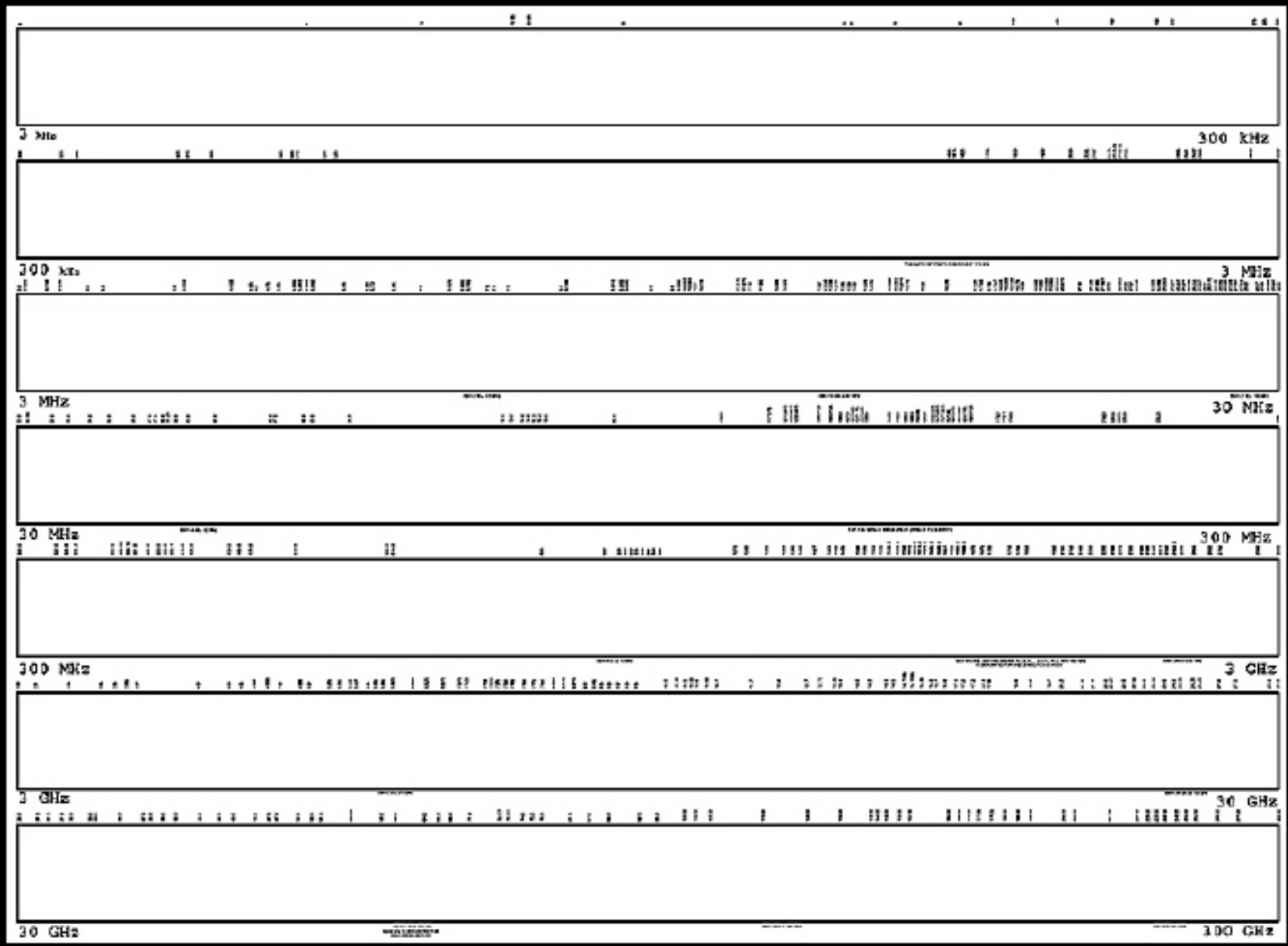

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